AP/3611/L4

MAY 2 8 2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: Appeal to the Board of Patent Appeals and Interferences

PATENT APPLICATION

14/Appeal Brief 8-Smith

In re PATENT APPLICATION of
Inventor(s): FECTEAU et al.

Group Art Unit: 3611
Examiner.: Luby, Matthew D.

Appln. No.:	09	877,188
	Series Code ↑	Serial No. ↑

Atty. Dkt. P | 257000 (M#) | RP-00063-US4 (Client Ref)

Filed: June 11, 2001
Title: SNOWMOBILE RIDER POSITIONING

6/10/03

Date: May 28, 2003

RECEIVED
JUN 0 3 2003
GROUP 3600

Mail Stop Appeal Brief-Patents
Hon. Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

1. ☐ **NOTICE OF APPEAL**: Applicant hereby appeals to the Board of Patent Appeals and Interferences from the decision (not Advisory Action) dated _____ of the Examiner twice/finally rejecting claim(s) in this application or in this application and its parent application.
2. ☒ **BRIEF** on appeal in this application attached in triplicate (extendable up to 5 months).
3. ☐ An **ORAL HEARING** is respectfully requested under Rule 194 (due two months after Examiner's Answer- unextendable)
4. ☐ Reply Brief is attached in triplicate (due two months after Examiner's Answer – unextendable).
5. ☐ "Small entity" statement filed: ☐ herewith. ☐ previously.

6. ☐ Fee NOT required because paid in prior appeal in which the Board of Patent Appeals and Interferences did not render a decision on the merits (35 USC 134).

7. **FEE CALCULATION**

			Large/Small Entity		Fee Code
If box 1 above is X'd, ... enter			$320/160	$0	119/219
If box 2 above is X'd, ... enter			$320/160	$320	120/220
If box 3 above is X'd, ... enter			$280/140	$0	121/221
If box 4 above is X'd, ... enter nothing			- 0 - (no fee)		
8. Original due date: July 7, 2003					
9. Petition is hereby made to extend the original due date to cover the date this response is filed for which the requisite fee is attached.	(1 mo)	$110/$55			115/215
	(2 mos)	$410/$205			116/216
	(3 mos)	$930/$465			117/217
	(4 mos)	$1,450/$725			118/218
	(Usable only if box 2 is X'd--- 5 mos)	$1,970/$985	+$0		128/228
10. Enter any previous extension fee paid ☐ previously since above Original due date (item 8); ☐ with concurrently filed amendment			-$0		
11. **Subtract line 10 from line 9 and enter: Total Extension Fee**				+$0	
12. **TOTAL FEE =**				$320	

PLEASE CHARGE OUR DEP. ACCT.

(Our Deposit Account No. 03-3975)
(Our Order No. 86169 (C#) | 257000 (M#))

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficiencies only) now or hereafter relative to this application and the resulting Official Document under Rule 20, or credit any overpayment, to our Accounting/Order Nos. shown above, for which purpose a duplicate copy of this sheet is attached.
This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal sheet is filed.

Pillsbury Winthrop LLP
Intellectual Property Group

P.O. Box 10500
McLean, VA 22102
Tel: (703) 905-2000

By: Atty: **John P. Darling** **Reg. No. 44,482**

Sig: John P. Darling

Fax: (703) 905-2500
Tel: **(703) 905-2045**

Atty/Sec: JPD/tmt

NOTE: File this cover sheet in duplicate with PTO receipt (PAT-103A) and attachments

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re PATENT APPLICATION OF:

FECTEAU et al.

Group Art Unit: 3611

Appln. No.: 09/877,188

Examiner: Luby, Matthew D.

Filed: June 11, 2001

Title: SNOWMOBILE RIDER POSITIONING

BRIEF ON APPEAL

PILLSBURY WINTHROP LLP
1600 Tysons Boulevard
McLean, Virginia 22102
Telephone: (703) 905-2000
Attorneys for Appellant

Date: May 28, 2003

TABLE OF CONTENTS

INTRODUCTION

This Appeal is from an Office Action mailed April 7, 2003, finally rejecting claims 1-117 of the above-identified patent application.

A. Real Party in Interest

The real party in interest for this Appeal and the present application is Bombardier Inc., by way of an Assignment recorded in the U.S. Patent and Trademark Office at Reel 011891, Frame 0693.

B. Statement of Related Appeals and Interferences

This application is a continuation-in-part application of U.S. Application 09/472,134, filed December 23, 1999, which is presently under appeal by way of a Brief on Appeal filed on May 27, 2003. The related appeal is directed to different aspects of this inventive concept, and appeals rejections based on different issues. Therefore, the outcome of the appeal in U.S. Application 09/472,134 should not directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

As these appeals are related to the same overall inventive concept, for purposes of efficiency and enhanced understanding, Appellants intend to file motions at the appropriate time for oral hearings in these two appeals to be scheduled consecutively and for introductions of exhibits during each oral hearing. Appellants intend to present a prior art vehicle and a vehicle designed in accordance with this invention as exhibits.

C. Status of Claims

Claims 1-117 are pending, stand rejected, and are on appeal. The claims on appeal are set forth in the attached Appendix A. Claims 1, 26, 52, 67, 77, 84, 92, 100 and 104 are independent. Claims 2-25 and 109 depend from claim 1; claims 27-51 and 110 depend from claim 26; claims 53-66 and 111 depend from claim 52; claims 68-76 and 112 depend from claim 67; claims 78-83 and 113 depend from claim 77; claims 85-91 and 114 depend from

claim 84; claims 93-99 and 115 depend from claim 92; claims 101-103 and 116 depend from 100; and claims 105-108 and 117 depend from claim 104.

D. Status of Amendments

An Amendment under 37 C.F.R. §1.111 was filed February 10, 2003 in response to an October 8, 2002 Office Action. The April 7, 2003 Final Office Action indicates that claims 1-117, including amended claim 52 and new claims 109-117 set forth in the February 10, 2003 Amendment are rejected. All claim amendments have been entered of record.

II. SUMMARY OF THE INVENTION

A. Background

The parent application, 09/472,134, was originally filed including claims directed to a snowmobile. Original claims 1-83 included recitations, for example, of the distance between a vertical line through a first center of gravity of the snowmobile without a rider and a vertical line passing through a second center of gravity of the snowmobile with the rider, and recitations, for example, of the angle of a line passing through the first and second centers of gravity with respect to horizontal.

Various claims of the parent application were rejected under 35 U.S.C. § 101 on the grounds that "Applicant improperly defines his invention with respect to a rider's body." The claims of the parent application that were rejected under 35 U.S.C. § 101 were also rejected under 35 U.S.C. §112, second paragraph as indefinite on the grounds that "the relationship of parts is not based on any known standard for sizing the vehicle to a rider."

In response to Appellants' arguments that the claims defined statutorily patentable subject matter and particularly pointed out and distinctly claimed the subject matter that Appellants regarded as their invention, the examiner stated in a September 12, 2000 Office Action (Appendix B) "Applicant has clearly avoided claiming dimensions of the snowmobile

with respect to a known standard. The examiner sees no reason why, if applicant meant to claim particular dimensions of the vehicle, he did not do so." (See page 7, paragraph number 15 of Appendix B.)

Taking the examiner's cue, the instant application was prepared and filed, in part, in response to the examiner's suggestion. Specifically, the instant application discloses and claims the inventors' snowmobile in terms of the dimensions of the snowmobile.

B. Related Art Problems Overcome by the Invention

Conventional snowmobiles share a common construction that combines features and elements so that a rider sits in a generally upright position in a location toward the rear of the snowmobile. The rider sits a considerable distance behind the center of gravity of the snowmobile, located at or proximate to the axis of the forward-most of the drive track. (Page 1, paragraph [0003].)

The positions of the handle bars, seat and foot rests of a conventional snowmobile relative to the center of gravity of the snowmobile place the driver far behind the center of gravity and cause the driver to more strongly feel each bump as the snowmobile travels over the ground. As the snowmobile encounters a bump, the snowmobile pivots about the center of gravity and acts as a lever that amplifies the magnitude of the force that is transferred from bumps on the ground to the rider. (Page 1, paragraphs [0004] and [0005].)

A passenger on the snowmobile is positioned even further away from the center of gravity and feels each bump even more strongly than the driver of the snowmobile. A third seat has not been added to conventional snowmobiles because the second passenger (third rider) would be positioned even further from the center of gravity and experience prohibitively larger forces. (Pages 1 and 2, paragraphs [0005] and [0006].)

Although the positioning of the driver and passenger on the conventional snowmobile is adequate for enjoying the sport, a need has arisen for a snowmobile where the driver's and passenger's positions are improved to minimize the affect on the riders due to the snowmobile's movement over uneven terrain. In addition, a design has developed for a snowmobile that may comfortably accommodate two passengers in addition to the driver. (Page 2, paragraphs [0007] and [0008].)

C. Object of the Invention

It is an object of the invention to improve upon the conventional design by repositioning the riders on a snowmobile and redesigning the layout of the snowmobile to minimize the effect of the snowmobile's movement on the driver and passengers as they pass over uneven terrain. It is also an object of the invention to facilitate the addition of a third seat for a third rider, who may experience a reasonably comfortable ride. (Page 2, paragraph [0009].)

D. Embodiments of the Invention

Referring to Figure 8, various dimensions of the six embodiments of the present invention are compared to dimensions of conventional snowmobiles on Page 10. Reference characters A-N and ϵ represent variables that are commonly defined below. The positive direction is defined backward relative to the direction of travel of the snowmobile and horizontal distances are measured when the unloaded snowmobile is positioned on level ground. (Page 6, paragraph [0034].) In other words, positive distances are measured from front to back of the snowmobile. Horizontal distances A-N are measured in millimeters and are understood to be preferably within 25 mm of the stated dimension shown in Figure 8, more preferably within 15 mm of the dimension and even more preferably within 5 mm of the dimension. The horizontal distances are summarized as follows:

A – axis of the forward-most drive axle to the center of gravity of the unloaded snowmobile;

B – steering position to the center of gravity of the unloaded snowmobile;

C – center of gravity of the unloaded snowmobile to the center of gravity of the first rider (driver);

D – center of gravity of the unloaded snowmobile to a seat position of the first rider (driver);

E – center of gravity of the first rider to a center of gravity of the second rider;

F – seat position of the first rider (driver) to a seat position of the second rider (first passenger);

G – center of gravity of the second rider to the center gravity of the third rider (second passenger);

H – second seat position to a third seat position;

I – center of gravity of the unloaded snowmobile to a combined center of gravity of the snowmobile and first rider;

J – center of gravity of the unloaded snowmobile to a combined center of gravity of the snowmobile, first rider and second rider;

K – center of gravity of the unloaded snowmobile to the combined center of gravity of the snowmobile and first through third riders;

L – steering position to a rearward most seat position;

M – back end of the frame of the snowmobile to the back end of the second seat section; and

N – back of the frame of the snowmobile to a rear most seat position. (Page 6, paragraph [0035].)

Angle ϵ is measured between vertical and an angular position of a steering shaft of the snowmobile. (Page 6, paragraph [0035].)

Snowmobiles may be manufactured with either a short frame or a long frame. A short frame preferably has a length of about 1493 mm. The short frame provides the driver with the feeling that the snowmobile is lighter and more maneuverable than a snowmobile with a long frame. The short frame also reduces the polar moment of inertia of the snowmobile about the vertical axis. The long frame is about 1913 mm long, provides two or more permanent seats and a larger cargo space.

1. Embodiment 1 of the Invention

Referring to Figure 2, the snowmobile 10 has a forward end 11 and a rearward end 13 that are defined consistently with the travel direction of the snowmobile 10. The snowmobile 10 includes a body 12, a frame 14, and a motor (e.g., an internal combustion engine) 17 carried by the frame at the forward end 11. Two skis 16 are attached to the forward end 11 of the frame 14 through a suspension system 18. A drive track 20 is disposed under the frame 14 and connected operatively to the motor 17. (Page 7, paragraph [0037].)

A straddle type seat 50 is disposed on the frame 14 behind the motor 17 and has a first seat position 52, which is defined as a portion of the seat 50 that is adapted to support a center of a weight distribution of the first rider 26 on the seat. The term "seat position" defines

particular positions on the snowmobile 10 that are adapted to function as the seat position for a standard rider, the dimensions of which are shown in Figures 9 and 10. Riders 26, 28 and 30 are standard riders. (Page 8, paragraphs [0039] and [0040].)

A steering device 32 is positioned at the forward end of the snowmobile 10 above the motor 17 and has a steering position defined by a center of a portion of the steering device adapted to be held by the hands of the rider 26. The steering device 32 may be a handlebar, a steering wheel or yoke of the type used in aircraft or a handlebar. (Page 8, paragraphs [0041] and [0042.])

A steering shaft 36 operatively connects the steering device 32 to the two skis 16 and is disposed over the motor 17 at an angle ϵ from vertical. The position of the axis of the steering shaft 36 is more steeply sloped than steering shaft 136 in prior art snowmobile 110 (Figure 1) having a steering shaft over the engine. The angle ϵ is less than 45°, more preferably between 25 and 40°, more preferably between about 30 and 35° and most preferably about 33°. (Page 9, paragraph [0044].)

The provision of the angle ϵ less than 45° facilitates placement of the steering position 34 in a position on the snowmobile 10 that is forward of the steering position 134 for the conventional snowmobile 110, shown in Figure 1. The forward position of the steering position 34 moves the riders 26 and 28 closer to the center of gravity 46 of the snowmobile 10 and improves the comfort of riders 26 and 28. Additionally, the turning force applied by the first rider (driver) 26 is more directly applied to steer the snowmobile 10 when the angle ϵ is less than 45°. (Page 9, paragraph [0045].)

Because the steering device 32 is shifted forward, the steering position 34 is disposed in front of the center of gravity 46 of the snowmobile 10 by distance B, in contrast to the steering position 134 of the conventional snowmobile 110 which is behind the center of gravity 146 of the prior art snowmobile 110, shown in Figure 1. (Page 9, paragraph [0046].)

The first seat position 52 is located behind the forward-most drive axle 44 by a horizontal distance calculated as distance D plus distance A. In the snowmobile 10 of the first embodiment, this distance is less than 590 mm, in contrast to the first seat position 152 of the conventional snowmobile 110, shown in Figure 1, which is a much larger 905 mm behind forward-most drive axle 144. (Page 10, paragraph [0050].)

The second seat position 54 is disposed on the seat 50 behind the first seat position 52 and is adapted to accommodate a second rider (first passenger) 28. The second seat position 54 is disposed the distance F behind the first seat position 52. As the first seat position 52 of the inventive snowmobile 10 is moved forward compared to the first seat position 152 of the conventional snowmobile 110, the second seat position 54 of the inventive snowmobile 10 is in a position similar to the driver of the conventional snowmobile 110, thus improving the ride for the second rider (first passenger) 28 of the inventive snowmobile 10. (Pages 10 and 11, paragraph [0051].)

As illustrated in Figure 8, the center of gravity 27 of the first rider 26 is closer to the center of gravity 46 of the inventive snowmobile 10, as shown by the distance C, than the center of gravity 127 of the first rider 26 would be on the conventional snowmobile 110. (Page 11, paragraph [0054].)

The center of gravity 29 of the second rider (first passenger) 28 is also disposed behind the center of gravity 46 of the inventive snowmobile 10 by the distance C plus the distance E, which is less than distance that the center gravity 129 of a second rider 128

would be behind the center of gravity 146 of the conventional snowmobile 110. (Page 12, paragraph [0055].)

2. Embodiment 2 of the Invention

Referring to Figure 3, the inventive snowmobile 210 of the second embodiment has a shorter frame and a shorter drive track 220 than the frame 14 and the track 20 of the first embodiment of the inventive snowmobile 10. The short frame 214 and drive track 220 reduce the rotational inertia of the inventive snowmobile 210 of the second embodiment and improve its handling performance. The distances A-F, I, J, and K-N of the second embodiment are correspondingly altered from the first embodiment, as shown in Figure 8. (Page 12, paragraphs [0056] and [0057].)

Because the steering device 32 is shifted forward relative to the conventional snowmobile 110, the forward-most drive axle 244 of the inventive snowmobile 210 is disposed behind the steering position 34 by a distance calculated as distance B minus distance A. According to the second embodiment of the invention, in fact as with all of the embodiments of the present invention, this distance is positive. In contrast, the steering position 134 on conventional snowmobile 110 is positioned behind the forward-most drive axle 144 of the conventional snowmobile 110 (i.e., the distance is negative), as shown in Figures 1 and 8. (Page 13, paragraph [0059].)

3. Embodiment 3 of the Invention

Referring to Figures 4A and 4B, the snowmobile 310 of the third embodiment has a short frame 314 and drive track 320, like the snowmobile 210 of the second embodiment. As in all embodiments of the present invention, the axle of the steering shaft 36 forms an angle ϵ

with vertical that is less than 45° which moves the positions of the riders 26 and 28 closer to the center of gravity 346 of the snowmobile 310. As in all of the embodiments of the present invention, the forward-most drive axle 344 of the snowmobile 310 is disposed behind the steering position 34 by the distance calculated as distance B minus distance A, which is a positive distance. (Page 14, paragraphs [0066], [0067] and [0068].)

The seat 350 includes a first seat section 350' and a second seat section 350'' as shown in Figure 4B. In the third embodiment, the second seat section 350'' is removable and cargo space 394 is provided behind the first seat section 350' beneath the second removable seat 350''. A cover 395 can be attached over the cargo space 394 when the second seat section 350'' is not attached. (Page 15, paragraph [0069].) A support element 360 extends upwardly and rearwardly from the frame 314 and fasteners secure the second seat section 350'' to the frame 314 via the support element 360, as shown in Figure 4B. (Page 16, paragraph [0072].)

A tunnel 314' forms the back end 314'' of the frame 314. A snow flap 380 extends rearwardly behind the back end 314''. The support element 360 extends rearwardly behind the back end 314'' of the frame 314 to structurally support the second seat section 350'' behind the back end 314''. The second seat position 354 is disposed second seat section 350'' a distance N behind the back end 314''. In the third embodiment, the distance N is positive in contrast to the second seat position 154 of the conventional snowmobile 110 which does not extend behind the back end of the frame because the second rider (first passenger) 28 would be prohibitively far away from the center of gravity 146 of the conventional snowmobile 110. (Pages 15 and 16, paragraphs [0073] and [0074].)

4. Embodiment 4 of the Invention

Referring to Figure 5, the snowmobile 410 of the fourth embodiment has a long frame 414 and drive track like the snowmobile 10 of the first embodiment. (Page 17, paragraph [0079].) The axis of the steering shaft 36 forms an angle ϵ with vertical that less than 45°, which permits placement of the steering position 34 forward of the forward-most drive axle 444 by the distance calculated as distance B minus distance A. In contrast, the steering position on the conventional snowmobile 110 is positioned behind the forward-most drive axle 144. (Page 17, paragraphs [0080] and [0081].)

The seat 450 includes a integral seat defining a first seat position 452, a second seat position 454, and a third seat position 456. (Pages 17 and 18, paragraphs [0082], [0083] and [0084]). The third rider (second passenger) 30 of the inventive snowmobile 410 is closer to the center of gravity 446 of the snowmobile 410 and experiences less forces than a second rider (first passenger) 28 would experience on the conventional snowmobile 110. (Page 18, paragraph [0084].)

5. Embodiment 5 of the Invention

Referring to Figures 6A and 6B, the snowmobile 510 has long frame 514 and drive track 520 like the snowmobile 10 of the first embodiment. As in all of the embodiments of the present invention, the axis of the steering shaft 36 forms an angle ϵ with vertical that is less than 45° and the steering position 34 is disposed ahead of the forward-most drive axle 554 by a distance calculated as distance B minus distance A. (Page 19, paragraph [0091].)

The seat 550 is formed by a first seat section 550' and second a seat section 550'' that is removable. A cover, shown in Figures 11A-D, may be used to cover a cargo space 594

located beneath the second seat section 550'' and behind the first seat section 550'. (Page 20, paragraph [0092].)

A tunnel 514' forms the back end 514'' of the frame 514 and a snow flap 580 extends rearwardly behind the back end 514''. A support element 560 extends upwardly and rearwardly from back end 514'' to provide support for the second seat section 550''. The third seat position 556 and back end of the second seat section 550'' extend behind the back end 514'' of the frame 514 by positive distances N and M respectively. (Pages 20 and 21, paragraphs [0096] and [0097].)

6. Embodiment 6 of the Invention

Referring to Figure 7, the snowmobile 610 of the sixth embodiment may have a short or long frame 614. As in all of the embodiments of the present invention, the axis of the steering shaft 36 forms an angle ϵ with vertical that less than 45° and the steering position 43 is disposed ahead of the forward-most drive axle 644 by a distance calculated as distance B minus distance A, in contrast to the steering position 34 of the conventional snowmobile 110 which is positioned behind the forward-most drive axle 144. (Pages 22 and 23, paragraphs [0105]-[0107].)

The snowmobile 610 has a seat 650 configured to a single rider 26 that defines a seat position 652. The seat position 652 is behind the forward-most drive axle 644 by a horizontal distance calculated as distance D plus distance A which is preferably between 540 mm and 590 mm. In contrast, the first seat position 152 of the conventional snowmobile 110 is a much larger 905 mm behind the forward-most drive axle 144, as shown in Figure 1. (Page 23, paragraph [0108].)

III. ISSUES AND REJECTIONS

The April 7, 2003 Office Action rejects claims 109-117 under 35 U.S.C. §112, first paragraph; rejects claims 1-21, 24, 26-47, 50 and 77-108 under 35 U.S.C. §103(a) over Applicants' admitted prior art (AAPA) in view of Yoshioka et al. (U.S. Patent 5,474,146); rejects claims 109, 110 and 113-117 under 35 U.S.C. §103(a) over AAPA in view of Yoshioka et al. and Imai et al. (U.S. Patent 4,804,198); rejects claim 22, 23, 25, 48, 49 and 51 under 35 U.S.C. §103(a) over AAPA in view of Yoshioka et al. and Atherley (U.S. Patent 5,944,380); rejects claims 52-65 and 67-75 under 35 U.S.C. §103(a) over AAPA in view of Yoshioka et al. and Hisatomi (U.S. Patent 4,502,560); rejects claims 111 and 112 under 35 U.S.C. §103(a) over AAPA in view of Yoshioka et al., Hisatomi and Imai et al.; and rejects claims 66 and 76 under 35 U.S.C. §103(a) over AAPA in view of Yoshioka et al., Hisatomi and Atherley '380.

Thus, the issues on appeal are whether: 1) the specification satisfies the requirements of 35 U.S.C. §112, first paragraph; 2) claims 1-21, 24, 26-47, 50 and 77-108 are obvious over AAPA in view of Yoshioka et al.; 3) claims 109, 110 and 113-117 are obvious over AAPA in view of Yoshioka at al. and Imai et al.; 4) claims 22, 23, 25, 48, 49 and 51 are obvious over AAPA in view of Yoshioka et al. and Atherley '380; 5) claims 52-65 and 67-75 are obvious over AAPA in view of Yoshioka et al. and Hisatomi; 6) claims 111 and 112 are obvious over AAPA in view of Yoshioka et al., Hisatomi, and Imai et al. and 7) claims 66 and 76 are obvious over AAPA in view of Yoshioka et al., Hisatomi and Atherley '380.

IV. GROUPING OF CLAIMS

Each claim of this patent application is separately patentable and upon issuance of a patent will be entitled to a separate presumption of validity under 35 U.S.C. §282. For convenience in handling of this Appeal, the claims are grouped as follows:

Group I, claims 1-21, 77-83 and 100-103;

Group II, claims 26-47, 50, 92-99, and 104-108;

Group III, claims 52-65;

Group IV, claims 67-75;

Group V, claims 22, 23, 48 and 49; and

Group VI, claims 25 and 51;

Group VII, claims 66 and 76;

Group VIII, claims 109-117.

non-compliance at per 37 CFR 1.192(d) MPEP - 1206 - pp. 1200-10 → 1200-4

Each of Groups 1 through VIII will be argued separately. The groups do not stand or fall together.

Within Group I, claims 8-10, 21 and 77-83 stand or fall with claim 1.

Within Group II, claims 27-29 and 47 stand or fall with claim 26.

Within Group III, all of the claims are separately patentable.

Within Group IV, all of the claims are separately patentable.

Within Group V, claims 23 and 49 stand or fall with claims 22 and 48, respectively.

Within Group VI, all of the claims are separately patentable.

Within Group VII, all of the claims are separately patentable.

Within Group VIII, all of the claims are separately patentable.

V. ARGUMENT

A. The Law

1. The Law Regarding Requirements of the Specification Under 35 U.S.C. § 112, First Paragraph

The requirements of the specification are defined in 35 U.S.C. § 112, first paragraph, as follows:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. The Law Regarding Factual Inquires to Determine Obviousness/Non-Obviousness

Several basis factual inquiries must be made to determine obviousness or non-obviousness of patent application claims under 35 U.S.C. § 103. These factual inquiries are set forth in Graham v. John Deere Co., 383 US 1, 17, 148 USPQ 459, 467 (1966);

> Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or non-obviousness of the subject matter is determined.

As stated by the Federal Court in In re Ochiai, 37 USPQ 2d 1127, 1131 (Fed. Cir. 1995);

> [T]he test of obviousness *vel non* is statutory. It requires that one compare the claim's subject matter as a whole with the prior art to which the subject matter pertains. 35 U.S.C. § 103. The inquiry is thus highly fact-specific by design . . . When the references cited by the Examiner fail to establish a *prima facie* case of obviousness, the rejection is improper and will be overturned. In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988) (Emphasis added).

In rejecting claims under 35 U.S.C. § 103(a), an Examiner bears an initial burden of presenting a *prima facie* case of obviousness. A *prima facie* case of obviousness is established only if there is a suggestion or motivation to combine reference teachings; a reasonable expectation of success; and the prior art references, when combined, teach or suggest all the claim limitations. If an Examiner fails to establish a *prima facie* case, a rejection is improper and will be overturned. See In re Rijckaert, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993). "If examination . . . does not produce a *prima facie* case of unpatentability, then without more, the Applicant is entitled to the grant of the patent." In re Oetiker, 977 F.2d 1443, 1445-1446, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

B. Rejection Under 35 U.S.C. § 112, First Paragraph

Claims 110-115 and 117 depend from independent claims 26, 52, 67, 77, 84, 92 and 104, respectively, and each recite that the snowmobile further comprises a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and a trailing arm suspension system.

Claim 116 depends from independent claim 100 and recites that the snowmobile further comprises two skis disposed on the frame, and a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and trailing arm suspension system.

The April 7, 2003 Office Action rejects claims 109-117 under 35 U.S.C. § 112, first paragraph as allegedly containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The Office Action goes on to allege that

"Applicants' disclosure lacks support for the front suspension system being 'one of an A-arm suspension system and a trailing arm suspension system.'"

Although it is unclear if the rejection of claims 109-117 is for failing to the satisfy the enablement or written description requirement of 35 U.S.C. § 112, first paragraph, or both, it is respectfully submitted that the specification as originally filed, including the claims, satisfies both the written description and enablement requirements of the 35 U.S.C. §112, first paragraph.

Page 7, paragraph [0037] clearly discloses that the two skis 16 are attached to the forward end 11 of the frame 14 through a suspension system 18. Figures 2-7 also clearly schematically illustrate an A-arm suspension system operatively connecting the two skis 16 to the forward end of the frame. As stated in MPEP § 2163, "An Applicant shows possession of the claimed invention by describing the claimed invention with all of its limitations using such descriptive means as words, structures, figures, diagrams and formulas that fully set forth the claimed invention." Accordingly, it is respectfully submitted that the specification as originally filed, including page 7, paragraph [0037] and Figures 2-7, describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention. It is thus respectfully submitted that the specification as originally filed satisfies the written description requirement of 35 U.S.C. § 112, first paragraph and that claims 109-117 are fully supported by the specification as originally filed. As to the trailing arm suspension system, trailing arm suspensions are known to those skilled in the art , as they have been used on snowmobiles for at least the last ten years. (See, e.g., U.S. Patent 4,620,604 (Appendix C), assigned to Bombardier Inc., the Assignee of the instant application. See also U.S. Patents 6,125,958 and 6,343,666 (Appendices D and E, respectively), assigned to Appellant's competitor, Polaris Industries. It

is respectfully submitted that Appellants have disclosed a suspension and it is not necessary for Appellants to describe every single type of suspension known to those of ordinary skill in the art to demonstrate possession of the claimed subject matter as of the filing date. By disclosing the genus "suspension," Appellant has shown possession the claimed species of suspensions. Moreover, the trailing arm suspension is illustrated in Figure 1, as would be appreciated by those skilled in the art.

With respect to the enablement requirement of 35 U.S.C. § 112, first paragraph, MPEP § 2164.04 states "In order to make a rejection, the examiner has the initial burden to establish a reasonable basis to question the enablement provided for the claimed invention." MPEP § 2164.04 goes on to state "the minimum requirement is for the examiner to give reasons for the uncertainty of the enablement." It is respectfully submitted that the examiner has failed to carry the initial burden of establishing a reasonable basis to question the enablement of the claimed invention. The examiner has provided no reasons for any uncertainty of the enablement of the claimed invention other than to allege that Applicants' disclosure lacks support for the front suspension system being one of an A-arm suspension system and a trailing arm suspension system. As discussed above, this is fully supported by the specification, including the drawings, as originally filed.

In addition, Appellants' priority application, Canadian Application 2,256,944 (Appendix F), which was incorporated by reference into the instant application, clearly discloses a front suspension system. (Appendix F, page 10, line 13 through page 11, line 12 and Figs. 16-21.) The front suspension system disclosed in Canadian Application 2,256,944 is clearly an A-arm suspension system, as shown in Figs. 16-21. Furthermore, Figures 1 and 2 of the Canadian priority application, like Figure 1 of the instant application, depict a snowmobile with a trailing arm front suspension, as would be appreciated by those skilled in

the art. It is respectfully submitted that the Appellants' Canadian priority application clearly demonstrates that Appellants were in position of the claimed invention as of the filing date of the application and that claimed invention was enabled by the disclosure as originally filed.

C. Rejections Under 35 U.S.C. § 103(a)

1. Applicants' Admitted Prior Art (AAPA)

The conventional snowmobile 110 (Figure 1) is constructed so as to position a rider (driver) 26 in a generally upright seated position in a location toward the rear of the snowmobile 110. When seated in this fashion, the rider 26 sits a considerable distance behind the center of gravity 146 of the snowmobile 110, which is located at or in proximity to the axis of the forward-most axle 144 of a drive track 120.

The snowmobile 110 includes a steering device 132 that defines a steering position 134 that is positioned behind both the forward-most axle 144 and the center of gravity 146 of the snowmobile 110. A second seat position 154 for a second rider (first passenger) 28 is positioned even further behind the forward-most axle 144 and the center of gravity 146 of the snowmobile.

The conventional snowmobile also includes a steering shaft 136 that operatively connects the steering device 132 to the front skis 116.

2. Yoshioka et al.

Yoshioka et al. disclose a snow vehicle constructed by utilizing a motorcycle and substituting a single steering ski 1 for the front wheel and an endless track device 2 for the rear wheel. (See column 8, lines 65 through column 9, line 2.) The vehicle body includes a front fork 3 that includes mounting portions 3a and 3b and a supporting portion 3c that are

utilized as mounting portions for mounting a mounting portion 21 of ski bracket 20. (See column 9, lines 21-28.)

In a preferred embodiment shown in Figures 41-43, Yoshioka et al. disclose a steering ski 201 attached to a pair of left and right brackets 252 that are positioned and operated integrally with the front forks 202.

The ski brackets 252 include a pair of inclined corner portions 257 that are maintained in spaced relationship from a pair of stopper surfaces 258 formed by bending the lower ends of the supporting member 250 and attaching the same to the upper surface of the steering ski 201, as shown in Figure 42. When a swing angle α of the steering ski 201, i.e., an angle defined by the steering axis S and a line L parallel to a general surface of the steering ski 201, is in a range less than about 90° during normal running, the corner portions 257 are maintained in spaced relationship from the pair of stopper surfaces 258. On the other hand, when the swing angle α exceeds the given range to reach about 90°, for example as in phantom line in Figure 41, the corner portions 257 are brought into abutment against the stopper surfaces 258. That is, when the steering ski 201 is swung at an angle Θ to be defined by the movement of the line L to a line L_1, resulting that the swing angle α becomes about 90°, further swinging operation of the steering ski 201 is restricted. With this construction, a stopper mechanism for restricting the swinging operation of the steering ski 201 can be simplified. (See column 18, line 9-27.)

3. Imai et al.

Imai et al. disclose a vehicle with steering-controlled torsion bar stabilizer. Referring to Figure 5, a snowmobile vehicle of the type using a double A-arm suspension including a

lower A-arm assembly 94 and an upper A-arm assembly 96 connected to a ski 10 by a pivot pipe 90 is shown.

A coil spring 118 surrounding a shock absorber 120 is operatively coupled between the frame of the vehicle and the lower A-arm assembly 94 to operate in a conventional fashion to cushion the vehicle against shocks to which the skis 10 may be subjected during travel over a regular surfaces. Anti-sway properties are added to the suspension system by torsion bar 122 attached to a link 124 which is attached to the lower A-arm assembly 94 by a linkage 128. (See column 8, lines 44-51.)

4. Atherley '380

Atherley '380 discloses a light-weight vehicle seat 10 having a base section 40 that is substantially rigid and provides support for the seat. A utility cavity 44 may be formed in the base section 40 for holding various items. An access opening 48 is formed in the seat 10 to provide access to the utility cavity 40. The cavity may be left open to the vehicle shown at 50, so that heat generated by the vehicle can be used to maintain temperatures of items contained in the cavity. (See column 3, lines 17-57.)

In an alternate embodiment, the vehicle seat 100 has base section 102 and a seat section 104 removably disposed on the base section 102. The seat section 104 may be attached to the base section 102 with hook and loop type fasteners. Seat sections of various densities may be provided such that seats have varying degrees of flexibility. Thus, riders of various weight may select a seat section 104 of appropriate flexibility to suit their comfort.

5. Hisatomi

Hisatomi discloses a small, lightweight snowmobile 11 including a frame assembly 12. The frame 12 includes a head pipe 13 that supports a front steering mechanism 14 that includes a first tubular member 15 having a handle bar assembly 16 affixed to the tubular member 15 for steering.

A seat 23 is carried by the frame assembly 12 to the rear of a fuel tank 22 also carried by the frame 12.

6. Claims 1-21, 24 and 77-91 Are Not Obvious Over AAPA in View of Yoshioka et al.

Claim 1 recites a snowmobile including a frame, a straddle-type seat disposed on the frame, first and second seat positions defined by the seat and an engine disposed on the frame in front of the seat, a drive track disposed below the frame and connected operatively to the engine for propulsion of the snowmobile, a forward-most drive track axle disposed on the frame, two skis disposed on the frame, a steering device having a steering position and steering shaft operatively connecting the two skis to the steering device for steering the snowmobile, wherein the steering shaft is disposed over the engine at an angle ϵ of less than 45° from vertical, the first seat position is disposed less than 590 mm behind the forward-most drive track axle and the second seat position is disposed behind the first seat position by between 265 mm and 365 mm.

The April 7, 2003 Office Action on page 3, paragraph number 5 states that AAPA discloses a snowmobile "having a steering position (a spot on the steering device, 132) disposed forward of the forward-most drive track (see Figure 1)."

It is respectfully submitted that AAPA, as shown in Figure 1 of the instant application, does not disclose or suggest a steering device having a steering position disposed

forward of the forward-most drive track axle, as alleged in the Office Action. As clearly shown in Figure 1 of the instant application, the steering position 134 is disposed behind, not forward, of the forward-most drive track axle 144.

In response to Appellants' argument that the examiner had misinterpreted AAPA with respect to the steering position (see page 6 of the Amendment filed February 10, 2003), the examiner argued that "Applicants have only recited a steering device having a steering position. This is interpreted to mean a spot on the steering device as was explained in the rejection in the last Office Action. If Applicants do not wish the steering position to be interpreted as a random spot on the steering device (as they contend it is not) then it is suggested they provide very specific clarification of where this is located an[sic] how it is related dimensionally to the other parts of the steering system and snowmobile as a whole." (See page 9, first full paragraph of the April 7, 2003 Office Action.)

35 U.S.C. § 112, second paragraph states "The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." (Emphasis added.) Appellants have complied fully with this requirement. In particular, page 8, paragraph [0041] of the instant application states "the steering device 32 has a steering position 34, which is defined by a center of a portion of the steering device adapted to be held by the hands of the rider 26."

MPEP § 2111 states "During patent examination, the pending claims must be 'given the broadest reasonable interpretation consistent with the specification.'" (Emphasis added.) MPEP § 2111 also states "the 'PTO applies to verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definition

or otherwise that may be afforded by the written description contained in applicant's specification.'" (Emphasis added.)

It is respectfully submitted that the examiner's insistence on interpreting the claimed steering position to be any random spot on the steering device is inconsistent with the Patent Office's own policy on claim interpretation as set forth in MPEP § 2111. The steering position is not any random spot on a steering device. To the contrary, it is a center of a portion of a steering device adapted to be held by the hands of the rider as defined on page 8, paragraph [0041] of the instant application. The steering position 134 of AAPA, as shown in Figure 1, is clearly behind, not forward of as claimed, the forward-most drive track axle 144. In fact, as shown in Figure 1, the entire steering device 132 is behind the forward-most drive track axle 144. Thus, even under the examiner's improper interpretation, AAPA fails to disclose a steering position disposed forward of the forward-most drive track axle as every spot on the steering device 132 of the conventional snowmobile 110 is behind the forward-most drive track axle 144.

The April 7, 2003 Office Action on page 3, paragraph number 5 also states that AAPA discloses "the first seat position is disposed about 565 mm behind the forward-most drive axle, the second seat position is disposed behind the first seat position by about 340 or 290 mm, the third seat position is disposed behind the second seat position by about 310 or 355 mm, the steering position is disposed forward of the forward-most drive axle by about 65 mm and the frame is between 1493 and 1913 mm long (see Figures 1 and 8 describing various measured distances on a conventional snowmobile.)"

As clearly shown in Figure 8 of the instant application, the distance that the first seat position of the conventional snowmobile is disposed behind the forward-most drive axle (defined as the distance D plus the distance A) is 895 mm (795 + 110) for a long frame

conventional snowmobile and 905 mm (875 + 30) for a short frame conventional snowmobile. The first seat position of the conventional snowmobile shown in Figure 1 of AAPA is not disposed about 565 mm behind the forward-most drive axle, as alleged on page 3, paragraph number 5 of the Office Action.

Page 8, paragraph [0039] of the instant application states that "the inventors of the present invention define the term 'seat position' to point out particular positions on the snowmobile that are adapted to function as the seat position for a standard rider."

Appellants argued that the examiner had misinterpreted AAPA and that AAPA did not disclose a first seat position that is disposed less than 590 mm behind the forward-most drive track axle as recited in claim 1. (See page 5 of the February 10, 2003 Amendment.)

In response to Appellants' argument, the examiner on page 8, paragraph number 11 of the April 7, 2003 Office Action alleged "all that the claims require are first, second and third seat positions on a singular [seat unit] defined by the seat. The claims do not require 'particular positions on the snowmobile that are adapted to function as the seat position for a standard rider' as asserted in the response." As discussed above, it is respectfully submitted that the examiner's refusal to give pending claims the broadest reasonable interpretation consistent with the specification is improper and contrary to Patent Office policy as set forth in MPEP § 2111. Appellants have clearly and unambiguously set forth the metes and bounds of the term "seat position" and Appellants respectfully submit that the examiner's insistence on interpreting this term as any spot on the seat is clearly inconsistent with the specification and is, therefore, improper.

The conventional snowmobile of AAPA shown in Figure 1 of the instant application clearly does not disclose or suggest a first seat position less than 590 mm behind the forward-most drive track axle, as recited in claim 1. The examiner has simply taken the values shown

for the six embodiments of the invention disclosed in Figure 8 and applied those values to the values for the conventional snowmobile. This is clearly improper as Appellants have not admitted that the values shown for the six embodiments of the invention in Figure 8 apply to the values for the conventional snowmobile. In fact, Appellants drafted Figure 8 to clearly establish the difference in the values of the distances of the conventional snowmobile and the six embodiments of the inventive snowmobile. The examiner's allegation that Applicants admitted prior art discloses a snowmobile having a first seat position disposed about 565 mm behind the forward-most drive axle is flatly incorrect. Appellants have never made such an admission.

Claim 1 also recites that the steering shaft is disposed over the engine at angle ϵ of less than 45° from vertical. The Office Action on page 3, paragraph number 5, acknowledges that "AAPA does not specifically disclose that the angle of the steering shaft is 33° from the vertical." The Office Action than goes on to allege that "Yoshioka et al. disclose that the angle of the steering shaft of a snowmobile is 33° from the vertical (Figure 1 and column 18, lines 9-15) in order to construct a design for a steering shaft of a snowmobile incorporating a preferred angle for the steering shaft (inherent benefit - - which is that the angle is preferred so the design must necessarily incorporate that angle)." The Office Action on page 4, lines 4-7, goes on to conclude: "It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a steering shaft having an angle of 33° from the vertical on the AAPA snowmobile as taught by Yoshioka et al. in order to construct a preferred snowmobile design." The Office Action goes on to assert that "[i]t is noted that since it has been held that discovering an optimum value of a result effective variable (for example an optimum angle of a steering shaft, various seat positions as measured from a forward-most

drive axle or a distance between a steering position and forward-most drive axle) involves only routine skill in the art."

MPEP § 2143 states "To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teaching. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claimed limitations."

MPEP §2143.01 states "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art."

With respect to the examiner's allegation that "Yoshioka et al. discloses that the angle of the steering shaft of a snowmobile is 33° from the vertical," the undersigned has thoroughly reviewed the disclosure of Yoshioka et al. and can find no disclosure or suggestion that the steering axis S is 33° from the vertical, as alleged by the examiner. It is respectfully submitted that the examiner's determination that Yoshioka et al. disclose a steering shaft of a snowmobile that is disposed 33° from the vertical is, at best, mere speculation. At worst, the examiner's determination smacks of impermissible hindsight reconstruction of the claimed invention.

Yoshioka et al. merely disclose stopper surfaces 258 on a supporting member 250 that engage corner portions 257 of the ski brackets 252 that restrict swinging operation of the

steering ski 201. There is nothing disclosed or suggested whatsoever by Yoshioka et al. to establish the angle of the steering axis S to vertical, nor is there any disclosure or suggestion by Yoshioka et al. of modifying, changing, adjusting, experimenting with and/or optimizing any angle of the steering axis S with respect to vertical.

Although Figures 1 and 41 of Yoshioka et al. show the steering axis S at an unspecified angle to vertical, as stated in MPEP § 2125: "When the reference does not disclose that the drawings are to scale, and is silent as to dimensions, argument based on measurement of the drawing features are of little value." Yoshioka et al. are completely silent as to the angle of the steering axis S to vertical. The examiner's conclusion that the steering axis 5 of Yoshioka et al. is 33° from vertical is not supported by the text of Yoshioka et al. or the drawings of Yoshioka et al. According to the MPEP, the examiner's conclusion is of little value.

With respect to the assertion on page 4, lines 3-4 of the April 7, 2003 Office Action that Yoshioka et al. disclose an "inherent benefit - - which is that the angle is preferred so that the design must necessarily incorporate that angle," the undersigned simply does not understand the alleged motivation set forth by the examiner. It appears to be the position of the examiner that, because Yoshioka et al. "prefer" an angle of 33°, which as discussed above Yoshioka et al. do not disclose or suggest at all, one of ordinary skill would necessarily incorporate this angle into any snowmobile design. With respect to the examiner's assertions on page 4, lines 4-7, that it would have been obvious to provide the AAPA snowmobile with an angle of 33° as taught by Yoshioka et al. "in order to construct a preferred snowmobile design," the examiner's position appears to be that, because Yoshioka et al. "prefer" an angle of 33°, it would have been obvious to one of ordinary skill in the art to incorporate this angle

into a "preferred snowmobile design," one that just so happens to have the exact same dimensions as the one invented and claimed by Appellants.

It is respectfully submitted that obviousness cannot be established by merely taking the so-called "preferred design" of any one piece of prior art and applying that design feature to another piece of prior art "in order to construct a preferred design." The examiner has done nothing more than pick and choose from amongst various disclosures of prior art references in an attempt to reconstruct the claimed invention. In the instant rejection, the feature picked by the examiner, namely, the angle of the steering shaft with respect to vertical, is not even disclosed or suggested by the reference upon which the examiner relies. The rejection, thus, fails to present a *prima facie* case of obviousness against claim 1 as the combination of AAPA and Yoshioka et al. does not even disclose all the claim limitations. This failure, in combination with the utter lack of motivation or suggestion to combine the teachings of the references, clearly establishes that a *prima facie* case of obviousness has not been established, that the rejection is thoroughly improper, and that the rejection must be withdrawn.

With respect to the allegation on page 4, lines 8-12, where is noted that discovering optimum values of a result effective variable involves only routine skill in the art, MPEP § 2144.05 states: "A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation."

It is respectfully submitted that there is no recognition in AAPA or in Yoshioka et al. that varying the angle of the steering shaft, the seat positions as measured from a forward-most drive axle, or the distance between the steering position and the forward-most drive axle

will affect the results of the operation of the snowmobile of either the AAPA or Yoshioka et al. The examiner has provided absolutely no support and has not cited a single passage of either AAPA or Yoshioka et al. that supports the position that adjusting the angle of the steering shaft, the seat positions from the forward-most drive axle, or the distance between the steering position and forward-most drive axle would in any way achieve a recognized result.

MPEP § 2141 states "Patent examiners carry the responsibility of making sure that the standard of patentability enunciated by the Supreme Court and by the Congress is applied in each and every case." (Emphasis in original.) MPEP § 2141 further states "Office policy is to follow Graham v. John Deere Co. in the consideration and determination of obviousness under 35 U.S.C. §103. As quoted above, the four factual inquiries enunciated therein as a background for determining obviousness are as follows: (A) Determining the scope and contents of the prior art; (B) Ascertaining the differences between the prior art and the claims in issue; (C) Resolving the level of ordinary skill in the pertinent art; and (D) Evaluating evidence of secondary considerations."

In the instant application, the examiner has failed to determine the scope and content of the prior art because the examiner has mischaracterized AAPA by applying Appellants' inventive dimensions shown in Figure 8 to the conventional snowmobile of Figure 1 through a blatant disregard of PTO policy on claim interpretation and by improperly determining that Yoshioka et al. disclose Appellants' claimed steering shaft angle. The examiner has also failed to ascertain the differences between the prior art and the claims by improperly alleging that Appellants have admitted that the claimed dimensions apply to the conventional snowmobile of Figure 1. The examiner has failed to resolve the level of ordinary skill in the art, choosing instead to simply allege that one of ordinary skill in the art would simply mix

and match "preferred designs" from various prior art snowmobiles to arrive at a "preferred snowmobile design," presumably the snowmobile invented and claimed by Appellants. It is thus respectfully submitted that the examiner has failed to carry the responsibility of applying the standard of patentability in the instant application.

With respect to claim 2, neither AAPA nor Yoshioka et al. disclose or suggest an angle between 25° and 40° from vertical.

With respect to claim 3, neither AAPA nor Yoshioka et al. disclose or suggest an angle between 30° and 35° from vertical.

With respect to claim 4, neither AAPA nor Yoshioka et al. disclose or suggest an angle of 33° from vertical.

With respect to claim 5, neither AAPA nor Yoshioka et al. disclose or suggest a first seat position disposed behind the forward-most drive track axle between 550 mm and 580 mm.

With respect to claim 6, neither AAPA nor Yoshioka et al. disclose or suggest a first seat position disposed behind the forward-most drive track axle between 560 mm and 570 mm.

With respect to claim 7, neither AAPA nor Yoshioka et al. disclose or suggest a first seat position disposed behind the forward-most drive track axle about 565 mm.

Claims 8-10 stand or fall with claim 1.

Claim 11 recites that the second seat position is disposed behind the first seat position by between 275 mm and 305 mm. Claim 12 recites that the distance between 285 mm and 295 mm. Claim 13 recites that the distance is about 290 mm.

As shown in Figure 8, the second seat position of the conventional snowmobile of AAPA is disposed 340 mm (distance F) behind the first seat position for both a long frame conventional snowmobile and a short frame conventional snowmobile. 340 mm is not between 275 mm and 305 mm, nor is it between 285 mm and 295 mm, nor is it about 290 mm. Yoshioka et al. provide no disclosure, suggestion or motivation for a second seat position between 275 mm and 305 mm, between 285 mm and 295 mm, or about 290 mm behind a first seat position. The combination of AAPA and Yoshioka et al. thus fails to present a *prima facie* case of obviousness against each of claims 11-13.

Claim 14 recites that the snowmobile further comprises a third seat position on the seat, wherein the third seat position is disposed behind the second seat position by between 285 mm and 370 mm.

The April 7, 2003 Office Action on page 3, paragraph number 5 states that the AAPA disclose a snowmobile having first, second and third seat positions.

Page 2, paragraph [0066] of the instant application discloses, that while it would be desirable to add a third seat to accommodate a second passenger (third rider), it has not been done because the riders are positioned so far back on the conventional snowmobile 110 that a third rider would experience prohibitively large jostling forces. Appellants have never admitted that the conventional snowmobile 110, disclosed and discussed throughout the instant application, includes a third seat position. The examiner's determination that AAPA discloses a third seat position is, once again, a veiled refusal on the part of the examiner to properly interpret the claim language in accordance with Patent Office policy as set forth in MPEP §2111.

As Yoshioka et al. fail to disclose or suggest a third seat position on the snowmobile, the combination of AAPA and Yoshioka et al. fail to establish a *prima facie* case of obviousness against claims 14.

With respect to claim 15, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position between 295 mm and 325 mm.

With respect to claim 16, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position between 305 mm and 315 mm.

With respect to claim 17, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position about 310 mm.

With respect to claim 18, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position between 330 mm and 360 mm.

With respect to claim 19, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position between 340 mm and 350 mm.

With respect to claim 20, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position about 345 mm.

Claim 21 stands or falls with claim 1.

With respect to claim 24, neither AAPA nor Yoshioka et al. disclose or suggest first, second and third seat positions disposed on a singular seat unit.

Claims 77-83 stand or fall with claim 1.

Claim 84 recites that the steering shaft is disposed over the engine at an angle of less than 45° from vertical and is allowable for the reasons discussed above with respect to claim

1. In addition, claim 84 recites that the steering position is disposed forward of the forward-most drive track axle. Although Yoshioka et al. disclose a handle 5 disposed forward of a drive sprocket 8, it is respectfully submitted that it would not have been obvious to combine AAPA and Yoshioka et al., and in fact teach away from their combination, for at least the following reasons.

Conventional snowmobiles, such as the one disclosed in Figure 1 of the instant application, that include two steering skis prevent or impede the snowmobile from leaning into turns. Yoshioka et al. disclose a snow vehicle constructed utilizing a vehicle body of a motorcycle where a single steering ski has been substituted for the front wheel and an endless track device has been substituted for the rear wheel. Yoshioka et al. focus on enabling the snow vehicle to lean into a turn to improve handling, as this is conventional for the motorcycle upon which the vehicle of Yoshioka et al. is based. Yoshioka et al. state that it is an object of their invention to provide a saddle-riding type compact snow vehicle, wherein the endless track can readily follow the inclination of the vehicle body. (See column 2, lines 58-61.) Yoshioka et al. thus teach away from their combination with AAPA as the addition of the steering shaft of Yoshioka et al. to a conventional snowmobile (such as that shown in Figure 1 of the instant application) would defeat the object of the Yoshioka et al. snow vehicle, i.e. enabling the snow vehicle to incline into turns.

In addition, the steering shaft of the Yoshioka et al. snow vehicle serves both as a steering shaft and as the structural support for the steering ski. Conversely, in conventional snowmobiles such as that shown in Figure 1 of the instant application, the snowmobile structurally supports the steering skis through a suspension system that is distinct from the steering device. One of ordinary skill in the art therefore would not have been motivated to

combine the structural steering shaft of Yoshioka et al. with a conventional snowmobile such as that shown in Figure 1 of the instant application.

With respect to claim 85, neither AAPA nor Yoshioka et al. disclose or suggest an angle between 25° and 40° from vertical.

With respect to claim 86, neither AAPA nor Yoshioka et al. disclose or suggest an angle between 30° and 35° from vertical.

With respect to claim 87, neither AAPA nor Yoshioka et al. disclose or suggest an angle of 33° from vertical.

With respect to claim 88, neither AAPA nor Yoshioka et al. disclose or suggest a steering position disposed forward of a forward-most drive track axle between 40 mm and 90 mm.

With respect to claim 89, neither AAPA nor Yoshioka et al. disclose or suggest a steering position disposed forward of a forward-most drive track axle between 50 mm and 80 mm.

With respect to claim 90, neither AAPA nor Yoshioka et al. disclose or suggest a steering position disposed forward of a forward-most drive track axle between 60 mm and 70 mm.

With respect to claim 91, neither AAPA nor Yoshioka et al. disclose or suggest a steering position disposed forward of a forward-most drive track axle by about 65 mm.

Claim 100 recites that the seat position is disposed less than 590 mm behind the forward-most drive track axle and the frame is between 1493 mm and 1913 mm long.

Neither AAPA nor Yoshioka et al. disclose or suggest a snowmobile having a seat position disposed less than 590 mm behind the forward-most drive track axle and a frame between 1493 mm and 1913 mm long and the combination, which the references actually teach away from, fails to present a *prima facie* case of obviousness against claim 100.

With respect to claim 101, neither AAPA nor Yoshioka et al. disclose or suggest a first seat position disposed behind the forward-most drive track axle between 550 mm and 580 mm.

With respect to claim 102, neither AAPA nor Yoshioka et al. disclose or suggest a first seat position disposed behind the forward-most drive track axle between 560 mm and 570 mm.

With respect to claim 103, neither AAPA nor Yoshioka et al. disclose or suggest a first seat position disposed behind the forward-most drive track axle about 565 mm.

7. Claims 26-47, 50, 92-99 and 104-108 Are Not Obvious Over AAPA in View of Yoshioka et al.

Claims 26 recites a snowmobile including a frame, a straddle-type seat disposed on the frame, first and second seat positions defined by the seat, an engine disposed on the frame in front of the seat, a drive track disposed below the frame and connected operatively to the engine for propulsion of the snowmobile, a forward-most drive track axle disposed on the frame, a steering device having a steering position, and two skis disposed on the frame and operatively connected to the steering device, wherein the steering position is disposed forward of the forward-most drive track axle, a horizontal distance between the forward-most drive track axle and the first seat position is less than 590 mm, and the second seat position is disposed behind the first seat position by between 265 mm and 365 mm.

Claim 26 recites that the horizontal distance between the forward-most drive track axle and the first seat position is less than 590 mm and is thus allowable for all of the reasons discussed above with respect to claim 1, which recites the exact same feature. However, claim 26 is separately patentable in that it also recites that the steering position is disposed forward of the forward-most drive track axle.

As clearly shown in Figure 1, the steering position 134 of the conventional snowmobile 110 of AAPA is disposed behind, not in front, of the forward-most drive track axle 144. Although Yoshioka et al. disclose that the handle 5 is disposed forward of the drive sprocket 8, it is respectfully submitted that the combination of AAPA and Yoshioka et al. fails to present a *prima facie* case of obviousness against claim 26 as there is no suggestion or motivation to combine AAPA and Yoshioka et al. In fact, it is respectfully submitted that the references teach away from that combination.

Conventional snowmobiles, such as the one disclosed in Figure 1 of the instant application, that include two steering skis prevent or impede the snowmobile from leaning into turns. Yoshioka et al. disclose a snow vehicle constructed utilizing a vehicle body of a motorcycle where a single steering ski has been substituted for the front wheel and an endless track device has been substituted for the rear wheel. Yoshioka et al. focus on enabling the snow vehicle to lean into a turn to improve handling, as this is conventional for the motorcycle upon which the vehicle of Yoshioka et al. is based. Yoshioka et al. state that it is an object of their invention to provide a saddle-riding type compact snow vehicle, wherein the endless track can readily follow the inclination of the vehicle body. (See column 2, lines 58-61.) Yoshioka et al. thus teach away from their combination with AAPA as the addition of the steering shaft of Yoshioka et al. to a conventional snowmobile (such as that shown in

Figure 1 of the instant application) would defeat the object of the Yoshioka et al. snow vehicle, i.e. enabling the snow vehicle to incline into turns.

In addition, the steering shaft of the Yoshioka et al. snow vehicle serves both as a steering shaft and as the structural support for the steering ski. Conversely, in conventional snowmobiles such as that shown in Figure 1 of the instant application, the snowmobile structurally supports the steering skis through a suspension system that is distinct from the steering device. One of ordinary skill in the art, therefore, would not have been motivated to combine the structural steering shaft of Yoshioka et al. with a conventional snowmobile such as that shown in Figure 1 of the instant application.

Claims 27-29 stand or fall with claim 26.

Claim 30 recites that the second seat position is disposed behind the first seat position by between 275 mm and 305 mm. Claim 31 recites that the distance between 285 mm and 295 mm. Claim 32 recites that the distance is about 290 mm.

As shown in Figure 8, the second seat position of the conventional snowmobile of AAPA is disposed 340 mm (distance F) behind the first seat position for both a long frame conventional snowmobile and a short frame conventional snowmobile. 340 mm is not between 275 mm and 305 mm, nor is it between 285 mm and 295 mm, nor is it about 290 mm. Yoshioka et al. provide no disclosure, suggestion or motivation for a second seat position between 275 mm and 305 mm, between 285 mm and 295 mm, or about 290 mm behind a first seat position. The combination of AAPA and Yoshioka et al. thus fails to present a *prima facie* case of obviousness against each of claims 30-32.

Claim 33 recites that the steering position is disposed between 40 mm and 90 mm forward of the forward-most drive track axle. Claim 34 recites that the steering position is

disposed between 50 mm and 80 mm forward of the forward-most drive track axle. Claim 35 recites that the steering position is disposed between 60 mm and 70 mm forward of the forward-most drive track axle. Claim 36 recites that the steering position is disposed about 65 mm forward of the forward-most drive track axle.

Figure 8 shows that the distance between the steering position and the forward-most drive track axle (calculated as the distance B minus the distance A) is 65 mm for all six embodiments of the present invention. Figure 8 also shows that the distance between the steering position and the forward-most drive axle for the conventional snowmobiles is -270 mm (-160 - 110 for a long frame conventional snowmobile and -240 - 30 for short frame conventional snowmobile). -270 mm is not between 40 mm and 90 mm, is not between 50 mm and 80 mm, is not between 60 mm and 70 mm, and is not about 65 mm. As discussed above, there is no motivation or suggestion to combine AAPA and Yoshioka et al. In fact, as the two references teach away from their combination, the combination of AAPA and Yoshioka et al. fails to establish a *prima face* case of obviousness against each of claims 33-36.

With respect to claim 37, neither AAPA nor Yoshioka et al. disclose or suggest a first seat position disposed behind the forward-most drive track axle between 550 mm and 580 mm.

With respect to claim 38, neither AAPA nor Yoshioka et al. disclose or suggest a first seat position disposed behind the forward-most drive track axle between 560 mm and 570 mm.

With respect to claim 39, neither AAPA nor Yoshioka et al. disclose or suggest a first seat position disposed behind the forward-most drive track axle about 565 mm.

Claim 40 recites that the snowmobile further comprises a third seat position, wherein the third seat position is disposed behind the second seat position by between 285 mm and 370 mm.

The April 7, 2003 Office Action on page 3, paragraph number 5 states that the AAPA discloses a snowmobile having first, second and third seat positions.

Page 2, paragraph [0066] of the instant application discloses that while it would be desirable to add a third seat to accommodate a second passenger (third rider), it has not been done because the riders are positioned so far back on the conventional snowmobile 110 that a third rider would experience prohibitively large jostling forces. Appellants have never admitted that the conventional snowmobile 110, disclosed and discussed throughout the instant application, includes a third seat position. The examiner's determination that AAPA discloses a third seat position is, once again, a failure on the part of the examiner to properly interpret the claim language in accordance with Patent Office policy as set forth in MPEP §2111.

As Yoshioka et al. fail to disclose or suggest a third seat position on the snowmobile, and also fail to disclose or suggest a third seat position disposed behind a second seat position by between 285 mm and 370 mm, the combination of AAPA and Yoshioka et al. fail to establish a *prima facie* case of obviousness against claim 40.

With respect to claim 41, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position by between 295 mm and 325 mm.

With respect to claim 42, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position by between 305 mm and 315 mm.

With respect to claim 43, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position by about 310 mm.

With respect to claim 44, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position by between 330 mm and 360 mm.

With respect to claim 45, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position by between 340 mm and 350 mm.

With respect to claim 46, neither AAPA nor Yoshioka et al. disclose or suggest a third seat position disposed behind a second seat position by about 345 mm.

Claim 47 stands or falls with claim 26.

Claim 50 recites that the first, second and third seat positions are disposed on a singular seat unit. As neither AAPA nor Yoshioka et al. disclose or suggest a third seat position, or a first, second, and third seat position disposed on a singular seat unit, the combination fails to present a *prima facie* case of obviousness against claim 50.

Claim 92 recites a seat position disposed less than 590 mm behind the forward-most drive track axle and a steering position disposed forward of the forward-most drive track axle. As neither AAPA nor Yoshioka et al. disclose or suggest a seat position less than 590 mm behind the forward-most drive track axle, the combination fails to present a *prima facie* case of obviousness. In addition, as the references teach away from their combination, it would not have been obvious to modify the AAPA to place the steering position 134 forward of the forward-most drive track axle 144.

Claim 93 recites that the seat position is disposed between 550 mm and 580 mm behind the forward-most drive track axle. As shown in Figure 8, the distance that the seat

position is disposed behind the forward-most drive track axle is represented by the distance D plus the distance A and is 565 mm for all 6 embodiments of the present invention. Claim 94 recites that the distance is between 560 mm and 570 mm. Claim 95 recites that the distance is about 565 mm.

As also clearly shown in Figure 8, the distance that the seat position is disposed behind the forward-most drive track axle is 905 mm (795 + 110 for a long frame conventional snowmobile and 875 + 30 for a short frame conventional snowmobile). 905 mm is not between 550 mm and 580 mm, is not between 560 mm and 570 mm, and is not about 565 mm. The combination of AAPA and Yoshioka et al., thus, fails to present a *prima facie* case against each of claims 93-95.

Claim 96 recites that the steering position is disposed forward of the forward-most drive track axle by between 40 mm and 90 mm. Claim 97 recites that the distance is between 50 mm and 80 mm. Claim 98 recites that the distance is between 60 mm and 70 mm. Claim 99 recites that the distance is about 65 mm.

There is no motivation to combine AAPA and Yoshioka et al., and in fact the references teach away from their combination. In addition, neither AAPA nor Yoshioka et al. disclose or suggest a steering position disposed forward of a forward-most drive track axle by between 40 mm and 90 mm, between 50 mm and 80 mm, between 60 mm and 70 mm, or about 65 mm. The combination of AAPA and Yoshioka et al., thus, fails to present a *prima facie* case of obviousness against each of claims 96-99.

Claim 104 recites that the steering position is disposed forward of the forward-most drive track axle and the frame is between 1493 mm and 1913 mm long.

AAPA does not disclose or suggest a snowmobile having a steering position disposed forward of the forward-most drive track axle with a frame between 1493 mm and 1913 mm long. There is no motivation to combine AAPA and Yoshioka et al., as the references teaches away from their combination. The combination thus fails to present a *prima facie* case of obviousness against claim 104.

Claim 105 recites that the steering position is disposed forward of the forward-most drive track axle by between 40 mm and 90 mm. Claim 106 recites that the distance is between 50 mm and 80 mm. Claim 107 recites that the distance is between 60 mm and 70 mm. Claim 108 recites that the distance is about 65 mm.

There is no motivation to combine AAPA and Yoshioka et al. as the references teach away from their combination. In addition, neither AAPA nor Yoshioka et al. disclose or suggest a steering position disposed forward of a forward-most drive track axle by between 40 mm and 90 mm, between 50 mm and 80 mm, between 60 mm and 70 mm, or about 65 mm. The combination of AAPA and Yoshioka et al. thus fails to present a *prima facie* case of obviousness against each of claims 105-108.

8. Claim 52-65 Are Not Obvious Over AAPA in View of Yoshioka et al. and Hisatomi

Claim 52 recites a snowmobile including a frame including a tunnel, an engine disposed on the frame, a drive track disposed below the tunnel and connected operatively to the engine for propulsion of the snowmobile, two skis disposed on the frame, a steering device disposed on the frame and operatively connected to the two skis for steering the snowmobile, and a straddle-type seat disposed on the frame, wherein a back end of the seat extends behind a rearward-most portion of the frame.

Referring to Figure 8, the distance M, the distance that the back of the frame is spaced from the back of the seat, for embodiments 1 and 3-5 of the present invention, is a positive distance. As also clearly shown in Figure 8, the distance M for a conventional long frame snowmobile is -50 mm, meaning that the back end of the seat is in front of, not behind, a rearward-most portion of the frame. As also clearly shown in Figure 8, the distance M for a short frame conventional snowmobile is 0 mm, meaning that back end of the seat does not extend behind a rearward-most portion of the frame.

The Office Action on page 6, lines 1-11 alleges that Hisatomi discloses a back end of a snowmobile seat 23 extending behind a rearward-most portion of a frame 12 "for design choice purposes" and then concludes that it would have been obvious to one of ordinary skill in the art to provide a seat that extends behind the frame of the AAPA snowmobile at taught by Hisatomi "in order to construct a preferred snowmobile design."

It, again, appears to be the position of the examiner that it would have been obvious to one of ordinary skill in the art to take any "preferred design" from one prior art snowmobile and apply that "preferred design" to the conventional snowmobile of AAPA "in order to construct a preferred snowmobile design." Appellants, once again, respectfully submit that this proposed combination and/or modification is not suggested or motivated by AAPA, Yoshioka et al., or Hisatomi.

It is also respectfully submitted that Hisatomi is very similar to Yoshioka et al. in that that Hisatomi discloses a small-size snowmobile which is essentially based on a motorcycle frame. Moreover, Histomi is primarily concerned with the provision of a suspension support for a drive belt that allows relative pivotal movement of the frame about a axis that extends generally longitudinally to the frame so that an operator may lean the frame relative to the drive belt without changing the area of engagement between the drive belt and the terrain.

Hisatomi thus teaches away from a combination with AAPA in the same manner that Yoshioka et al. teach away from the combination with AAPA. As there is no motivation to combine AAPA, Yoshioka et al. and Hisatomi, the examiner has failed to present a *prima facie* case of obviousness against claim 52.

Claim 53 recites that the back end of the seat extends behind the rearward-most portion of the frame by between 205 mm and 255 mm (the distance M); claim 54 recites that the distance is between 215 mm and 245 mm; claim 55 recites that the distance is between 225 mm and 235 mm; claim 56 recites that the distance is about 230 mm; claim 57 recites that the distance is between 35 mm and 85 mm; claim 58 recites that the distance is between 45 mm and 75 mm; claim 59 recites that the distance is between 55 mm and 65 mm; claim 60 recites that the distance is about 60 mm; claim 61 recites that the distance is between 265 mm and 315 mm; claim 62 recites that the distance is between 275 mm and 305 mm; claim 63 recites that the distance is between 285 mm and 295 mm; and claim 64 recites that the distance is about 290 mm.

As clearly shown in Figure 8, the distance M for a conventional long frame snowmobile is -50 mm and 0 mm for a short frame conventional snowmobile. -50 mm and 0 mm are not between 205 mm and 255 mm are not between 215 mm and 245 mm; are not between 225 mm and 235 mm; are not about 230 mm; are not between 35 mm and 85 mm; are not between 45 mm and 75 mm; are not between 55 mm and 65 mm; are not about 60 mm; are not between 265 mm and 315 mm; are not between 275 mm and 305 mm; are not between 285 mm and 295 mm; and are not about 290 mm. The combination of AAPA, Yoshioka et al. and Hisatomi, thus, fails to present a *prima facie* case of obviousness against each of claims 53-64.

Claim 65 recites a support member attached to the frame that extends upwardly and rearwardly from the frame to provide structural support for the seat behind the back end of the frame.

The Office Action on page 6, lines 6-8 states that "Hisatomi discloses that the back end of a snowmobile seat (23) extends behind a rearward-most portion of the frame (12; see Figure 1) and a support member for the seat (see Figure 1) for design choice purposes (column 3, lines 1-2)."

Applicants again respectfully submit that obviousness cannot be determined by simply picking and choosing various design features of various prior art snowmobiles and concluding that one of ordinary skill in the art would have combined the various prior art features "in order to construct a preferred snowmobile design." One of ordinary skill in the art would not have been motivated to combine either of the motor cycle-based snow vehicles of Yoshioka et al. and Hisatomi with the conventional snowmobile of AAPA for the purpose of steering shaft construction and angle, seat configuration, or any other purpose. Hisatomi teaches away from its combination with AAPA in the same manner as Yoshioka et al. do. There is simply no motivation, other than impermissible hindsight, to provide the supposed support member of Hisatomi to the snowmobile of AAPA. The combination, thus, fails to present a *prima facie* case of obviousness against claim 65.

9. Claims 67-75 Are Not Obvious Over AAPA in View of Yoshioka et al. and Hisatomi

Claim 67 recites a snowmobile including a frame having a tunnel, an engine disposed on the frame, a drive track, two skis, a steering device, a straddle-type seat, and a seat position disposed on the seat, wherein the seat position is disposed behind a rearward-most portion of the frame. As clearly shown in Figure 8, the distance N for the third and fifth

embodiments of the present invention is 80 mm and 60 mm, respectively. As also clearly shown in Figure 8, the distance N for a long frame conventional snowmobile and short frame conventional snowmobile are -290 mm and -120 mm, respectively, meaning that the rear seat position is disposed forward, not behind, a rearward-most portion of the frame.

There is no motivation or suggestion to combine AAPA, Yoshioka et al. and Hisatomi as alleged by the examiner. Extending either seat position 152 or 154 of the conventional snowmobile 110 shown in Figure 1 of the instant application behind a rearward-most portion of the frame would increase jostling forces on the riders 26 and 28 of the conventional snowmobile. Therefore, one of ordinary skill in the art would not have been motivated by either Yoshioka et al. or Hisatomi to move the seat position to 152 and 154 behind a rearward-most portion of the frame.

Claim 68 recites that the seat position is disposed behind the rearward-most portion of the frame by between 35 mm and 85 mm (the distance N); claim 69 recites that the distance is between 45 mm and 75 mm; claim 70 recites that the distance is between 55 mm and 65 mm; claim 71 recites that the distance is about 60 mm; claim 72 recites that the distance is between 55 mm and 105 mm; claim 73 recites that the distance is between 65 mm and 95 mm; claim 74 recites that the distance is between 75 mm and 85 mm; and claim 75 recites that the distance is about 80 mm.

As clearly shown in Figure 8, the distance N for a long frame conventional snowmobile is -290 mm and -120 mm for a short frame conventional snowmobile. -290 mm and -120 mm are not between 35 mm and 85 mm; are not between 45 mm and 75 mm; are not between 55 mm and 65 mm; are not about 60 mm; are not between 55 mm and 105 mm; are not between 65 mm and 95 mm; are not between 75 mm and 85 mm; and are not about 80

mm. The combination of AAPA, Yoshioka et al. and Hisatomi, thus, fails to present a *prima facie* case of obviousness against each of claims 68-75.

10. Claims 22, 23, 48 and 49 Are Not Obvious Over AAPA in View of Yoshioka et al. and Atherley '380

Claims 22 and 48, which depend from 1 and 26, respectively, each recite that the seat comprises first and second seat sections, the second section being removable, the first seat position being on the first seat section, and the second seat position being on the second seat section.

The Office Action on page 5, paragraph number 7 alleges that Atherley '380 discloses a seat having first and second seat sections 106 and 104. As discussed above, what Atherley '380 actually discloses is a seat 100 having a base section 102 and a seat section 104 that is removably disposed on the base section 102 with hook and loop type fasteners to provide riders with choice of a seat section 104 with an appropriate flexibility. Atherley '380 does not disclose or suggest a seat having first and second seat sections with first and second seat positions, the first seat position being on the first seat section and the second seat position being on the second seat section, as recited in claims 22 and 48. As Atherley '380 does not disclose or suggest all of the claimed limitations of claims 22 and 48, the combination of AAPA, Yoshioka et al. and Atherley '380 fails to present a *prima facie* case of obviousness against each of claims 22 and 48.

Claims 23 and 49 stand or fall with claims 22 and 48, respectively.

11. Claims 25 and 51 Are Not Obvious Over AAPA in View of Yoshioka et al. and Athereley '380

Claims 25 and 51, which depend from claims 1 and 26, respectively, each recite that the seat comprises first and second seat sections, the second seat section being removable, the

first and second positions being on the first seat section, and the third seat position being on the second seat section.

Atherley '380 does not disclose or suggest a seat having first and second seat sections, the first and second seat positions being on the first section and the third seat position being on the second seat section. Atherley '380 merely discloses a seat having a single seat position with an exchangeable section 104 to provide a varying degree flexibility for riders of various weight.

As the combination of AAPA, Yoshioka et al. and Atherley '380 fails to include all of the limitations of claims 25 and 51, the combination fails to present a *prima facie* case of obviousness against each of claims 25 and 51.

12. Claims 66 and 76 Are Not Obvious in View of AAPA in View of Yoshioka et al. and Hisatomi and Atherley '380

Claim 66 recites that the seat comprises first and second seat sections, the second seat section being removable. Claim 76 recites that the seat comprises first and second sections, the second seat section being behind a first seat section, the second seat section being removable, and the seat position being on the second seat section.

The Office Action on page 7, paragraph number 10 states that the modified AAPA's snowmobile discloses all of Applicants' claimed invention except for a second seat section that is removable. As discussed in great detail above, the AAPA's snowmobile discloses none of Applicants' claimed invention and there is no motivation or suggestion to combine Yoshioka et al. and/or Hisatomi with AAPA. In addition, Atherley '380 merely discloses a seat having a removable section, but does not disclose or suggest a back end of the seat extending behind a rearward-most portion of the frame (note claim 52 from which claim 66 depends), nor does Atherley '380 disclose that the second seat section is behind the first seat

section, the second seat section being removable, and the seat position being on the second seat section, as recited in claim 76. As the combination of AAPA, Yoshioka et al., Hisatomi and Atherley '380 does not disclose or suggest all of the claimed limitations, the combination fails to present a *prima facie* case of obviousness against each of claims 66 and 76.

13. Claims 109-117 Are Not Obvious Over of Any Combination of AAPA in View of Yoshioka et al., Hisatomi and Imai et al.

Each of claims 109-117 recites a snowmobile including a front suspension system operatively connecting the two skis to the frame, wherein the front suspension is one of an A-arm suspension system and a trailing arm suspension system.

The Office Action on page 7, paragraph number 9 alleges that Imai et al. disclose a front suspension system connecting two skis to the frame in order to provide an increased sprint rate of the outside ski during cornering maneuvers to thereby decrease the sway of the vehicle due to centrifugal force. The Office Action concludes that it would have been obvious to one of ordinary skill in the art to provide a front suspension system that is one of an A-arm suspension system and a trailing suspension system on the modified AAPA snowmobile as taught by Imai et al. in order to decrease the sway of the vehicle due to centrifugal force.

As discussed in detail above, both Yoshioka et al. and Hisatomi are directed to vehicles in which the frame is pivotable relative to the endless track or belt to allow the rider to lean or incline the vehicle during a turn. Imai et al. provide a stabilizer system to prevent swaying, or inclining, of the vehicle during turning. In determining obviousness, the examiner has essentially combined two references, Yoshioka et al. and Hisatomi, having a similar objective of permitting inclining of the vehicle during turning, with a third reference, Imai et al., having the exact opposite objective. It is respectfully submitted that one of

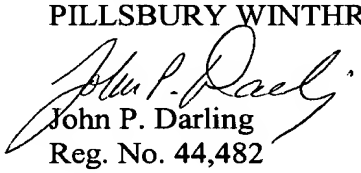
ordinary skill in the art would not have been motivated to reconcile these conflicting objectives and suggestions of Yoshioka et al., Hisatomi and Imai et al. As there is no suggestion or motivation to combine AAPA with Yoshioka et al., Hisatomi, and/or Imai et al., it is respectfully submitted that the various combinations fail to establish a *prima facie* case of obviousness against each of claims 109-117.

VI. CONCLUSION

For at least the reasons discussed above, it is respectively submitted that claims 109-117 are supported and/or enabled under 35 U.S.C. § 112, first paragraph; that claims 1-21, 24, 26-47, 50 and 77-108 are not obvious over of AAPA in view Yoshioka et al.; that claims 109, 110 and 113-117 are not obvious over AAPA in view of Yoshioka et al. and Imai et al.; that claims 22, 23, 25, 48, 49 and 51 are not obvious over AAPA in view of Yoshioka et al. and Atherley '380; that claims 52-65 and 67-75 are not obvious over AAPA in view of Yoshioka et al. and Hisatomi; that claims 111 and 112 are not obvious over AAPA in view of Yoshioka et al. and Hisatomi and Imai et al.; and that claims 66 and 76 are not obvious over AAPA in view of Yoshioka et al. and Hisatomi and Atherley '380.

For the above reasons, Appellant respectfully requests this Honorable Board to reverse the rejection of the claims.

Respectfully submitted,
PILLSBURY WINTHROP LLP



John P. Darling
Reg. No. 44,482

JPD:tmt
Attachments:
Appendices A-F

P.O. Box 10500
McLean, Virginia 22102
Tel.: (703) 905-2000
Fax: (703) 905-2500

VII. APPENDIX A

1. A snowmobile, comprising:

a frame;

a straddle-type seat disposed on the frame;

first and second seat positions defined by the seat;

an engine disposed on the frame in front of the seat;

a drive track disposed below the frame and connected operatively to the engine for propulsion of the snowmobile;

a forward-most drive track axle disposed on the frame;

two skis disposed on the frame;

a steering device having a steering position; and

a steering shaft operatively connecting the two skis to the steering device for steering the snowmobile, wherein the steering shaft is disposed over the engine at an angle ε of less than 45° from vertical, the first seat position is disposed less than 590 mm behind the forward-most drive track axle, and the second seat position is disposed behind the first seat position by between 265 mm and 365 mm.

2. The snowmobile of claim 1, wherein angle ε is between 25° and 40° from vertical.

3. The snowmobile of claim 2, wherein angle ε is between 30° and 35° from vertical.

4. The snowmobile of claim 3, wherein angle ε is 33° from vertical.

5. The snowmobile of claim 1, wherein the first seat position is disposed between 550 mm and 580 mm behind the forward-most drive track axle.

6. The snowmobile of claim 5, wherein the first seat position is disposed between 560 mm and 570 mm behind the forward-most drive track axle.

7. The snowmobile of claim 6, wherein the first seat position is disposed about 565 mm behind the forward-most drive track axle.

8. The snowmobile of claim 1, wherein the second seat position is disposed behind the first seat position by between 325 mm and 355 mm.

9. The snowmobile of claim 8, wherein the second seat position is disposed behind the first seat position by between 335 mm and 345 mm.

10. The snowmobile of claim 9, wherein the second seat position is disposed behind the first seat position by about 340 mm.

11. The snowmobile of claim 1, wherein the second seat position is disposed behind the first seat position by between 275 mm and 305 mm.

12. The snowmobile of claim 11, wherein the second seat position is disposed behind the first seat position by between 285 mm and 295 mm.

13. The snowmobile of claim 12, wherein the second seat position is disposed behind the first seat position by about 290 mm.

14. The snowmobile of claim 1 further comprising a third seat position on the seat, wherein the third seat position is disposed behind the second seat position by between 285 mm and 370 mm.

15. The snowmobile of claim 14, wherein the third seat position is disposed behind the second seat position by between 295 mm and 325 mm.

16. The snowmobile of claim 15, wherein the third seat position is disposed behind the second seat position by between 305 and 315 mm.

17. The snowmobile of claim 16, wherein the third seat position is disposed behind the second seat position by about 310 mm.

18. The snowmobile of claim 14, wherein the third seat position is disposed behind the second seat position by between 330 mm and 360 mm.

19. The snowmobile of claim 18, wherein the third seat position is disposed behind the second seat position by between 340 mm and 350 mm.

20. The snowmobile of claim 19, wherein the third seat position is disposed behind the second seat position by about 345 mm.

21. The snowmobile of claim 1, wherein the first and second seat positions are disposed on a singular seat unit.

22. The snowmobile of claim 1, wherein the seat comprises first and second seat sections, the second seat section being removable, the first seat position being on the first seat section, and the second seat position being on the second seat section.

23. The snowmobile of claim 22, wherein a cargo space is provided behind the first seat section beneath the second removable seat section.

24. The snowmobile of claim 14, wherein the first, second, and third seat positions are disposed on a singular seat unit.

25. The snowmobile of claim 14, wherein the seat comprises first and second seat sections, the second seat section being removable, the first and second seat positions being on the first seat section, and the third seat position being on the second seat section.

26. A snowmobile, comprising:

a frame;

a straddle-type seat disposed on the frame;

first and second seat positions defined by the seat;

an engine disposed on the frame in front of the seat;

a drive track disposed below the frame and connected operatively to the engine for propulsion of the snowmobile;

a forward-most drive track axle disposed on the frame;

a steering device having a steering position; and

two skis disposed on the frame and operatively connected to the steering device, wherein the steering position is disposed forward of the forward-most drive track axle, a horizontal distance between the forward-most drive track axle and the first seat position is less than 590 mm, and the second seat position is disposed behind the first seat position by between 265 mm and 365 mm.

27. The snowmobile of claim 26, wherein the second seat position is disposed behind the first seat position by between 325 mm and 355 mm.

28. The snowmobile of claim 27, wherein the second seat position is disposed behind the first seat position by between 335 mm and 345 mm.

29. The snowmobile of claim 28, wherein the second seat position is disposed behind the first seat position by about 340 mm.

30. The snowmobile of claim 26, wherein the second seat position is disposed behind the first seat position by between 275 mm and 305 mm.

31. The snowmobile of claim 30, wherein the second seat position is disposed behind the first seat position by between 285 mm and 295 mm.

32. The snowmobile of claim 31, wherein the second seat position is disposed behind the first seat position by about 290 mm.

33. The snowmobile of claim 26, wherein the steering position is disposed forward of the forward-most drive track axle by between 40 mm and 90 mm.

34. The snowmobile of claim 33, wherein the steering position is disposed forward of the forward-most drive track axle by between 50 mm and 80 mm.

35. The snowmobile of claim 34, wherein the steering position is disposed forward of the forward-most drive track axle by between 60 mm and 70 mm.

36. The snowmobile of claim 35, wherein the steering position is disposed forward of the forward-most drive track axle by about 65 mm.

37. The snowmobile of claim 26, wherein the horizontal distance between the forward-most drive track axle and the first seat position is between 550 mm and 580 mm.

38. The snowmobile of claim 37, wherein the horizontal distance between the forward-most drive track axle and the first seat position is between 560 mm and 570 mm.

39. The snowmobile of claim 38, wherein the horizontal distance between the forward-most drive track axle and the first seat position is about 565 mm.

40. The snowmobile of claim 26, further comprising a third seat position on the seat, wherein the third seat position is disposed behind the second seat position by 285 mm and 370 mm.

41. The snowmobile of claim 40, wherein the third seat position is disposed behind the second seat position by between 295 mm and 325 mm.

42. The snowmobile of claim 41, wherein the third seat position is disposed behind the second seat position by between 305 and 315 mm.

43. The snowmobile of claim 42, wherein the third seat position is disposed behind the second seat position by about 310 mm.

44. The snowmobile of claim 40, wherein the third seat position is disposed behind the second seat position by between 330 mm and 360 mm.

45. The snowmobile of claim 44, wherein the third seat position is disposed behind the second seat position by between 340 mm and 350 mm.

46. The snowmobile of claim 45, wherein the third seat position is disposed behind the second seat position by about 345 mm.

47. The snowmobile of claim 26, wherein the first and second seat positions are disposed on a singular seat unit.

48. The snowmobile of claim 26, wherein the seat comprises first and second seat sections, the second seat section being removable, the first seat position being on the first seat section, and the second seat position being on the second seat section.

49. The snowmobile of claim 48, wherein a cargo space is provided behind the first seat section beneath the second removable seat section.

50. The snowmobile of claim 40, wherein the first, second, and third seat positions are disposed on a singular seat unit.

51. The snowmobile of claim 40, wherein the seat comprises first and second seat sections, the second seat section being removable, the first and second seat positions being on the first seat section, and the third seat position being on the second seat section.

52. A snowmobile, comprising:

a frame including a tunnel;

an engine disposed on the frame;

a drive track disposed below the tunnel and connected operatively to the engine for propulsion of the snowmobile;

two skis disposed on the frame;

a steering device disposed on the frame and operatively connected to the two skis for steering the snowmobile; and

a straddle-type seat disposed on the frame, wherein a back end of the seat extends behind a rearward-most portion of the frame.

53. The snowmobile of claim 52, wherein the back end of the seat extends behind the rearward-most portion of the frame by between 205 mm and 255 mm.

54. The snowmobile of claim 53, wherein the back end of the seat extends behind the rearward-most portion of the frame by between 215 mm and 245 mm.

55. The snowmobile of claim 54, wherein the back end of the seat extends behind the rearward-most portion of the frame by between 225 mm and 235 mm.

56. The snowmobile of claim 55, wherein the back end of the seat extends behind the rearward-most portion of the frame by about 230 mm.

57. The snowmobile of claim 52, wherein the back end of the seat extends behind the rearward-most portion of the frame by between 35 mm and 85 mm.

58. The snowmobile of claim 57, wherein the back end of the seat extends behind the rearward-most portion of the frame by between 45 mm and 75 mm.

59. The snowmobile of claim 58, wherein the back end of the seat extends behind the rearward-most portion of the frame by between 55 mm and 65 mm.

60. The snowmobile of claim 59, wherein the back end of the seat extends behind the rearward-most portion of the frame by about 60 mm.

61. The snowmobile of claim 52, wherein the back end of the seat extends behind the rearward-most portion of the frame by between 265 mm and 315 mm.

62. The snowmobile of claim 61, wherein the back end of the seat extends behind the rearward-most portion of the frame by between 275 mm and 305 mm.

63. The snowmobile of claim 62, wherein the back end of the seat extends behind the rearward-most portion of the frame by between 285 mm and 295 mm.

64. The snowmobile of claim 63, wherein the back end of the seat extends behind the rearward-most portion of the frame by about 290 mm.

65. The snowmobile of claim 52, further comprising a support member attached to the frame that extends upwardly and rearwardly from the frame to provide structural support for the seat behind the back end of the frame.

66. The snowmobile of claim 65, wherein the seat comprises first and second seat sections, the second seat section being removable.

67. A snowmobile, comprising:

a frame having a tunnel;

an engine disposed on the frame;

a drive track disposed below the tunnel and connected operatively to the engine for propulsion of the snowmobile;

two skis disposed on the frame;

a steering device disposed on the frame and operatively connected to the two skis for steering the snowmobile;

a straddle-type seat disposed on the frame behind the steering device; and

a seat position disposed on the seat, wherein the seat position is disposed behind a rearward-most portion of the frame.

68. The snowmobile of claim 67, wherein the seat position is disposed behind the rearward-most portion of the frame by between 35 and 85 mm.

69. The snowmobile of claim 68, wherein the seat position is disposed behind the rearward-most portion of the frame by between 45 and 75 mm.

70. The snowmobile of claim 69, wherein the seat position is disposed behind the rearward-most portion of the frame by between 55 and 65 mm.

71. The snowmobile of claim 70, wherein the seat position is disposed behind the rearward-most portion of the frame by about 60 mm.

72. The snowmobile of claim 67, wherein the seat position is disposed behind the rearward-most portion of the frame by between 55 mm and 105 mm.

73. The snowmobile of claim 72, wherein the seat position is disposed behind the rearward-most portion of the frame by between 65 and 95 mm.

74. The snowmobile of claim 73, wherein the seat position is disposed behind the rearward-most portion of the frame by between 75 and 85 mm.

75. The snowmobile of claim 74, wherein the seat position is disposed behind the rearward-most portion of the frame by about 80 mm.

76. The snowmobile of claim 67, wherein the seat comprises first and second seat sections, the second seat section being behind the first seat section, the second seat section being removable, and the seat position being on the second seat section.

77. A snowmobile, comprising:

a frame;

a straddle-type seat disposed on the frame;

a seat position defined by the seat;

an engine disposed on the frame in front of the seat;

a drive track disposed below the frame and connected operatively to the engine for propulsion of the snowmobile;

a forward-most drive track axle disposed on the frame;

two skis disposed on the frame;

a steering device having a steering position; and

a steering shaft operatively connecting the two skis to the steering device for steering the snowmobile, wherein the steering shaft is disposed over the engine at an angle ε of less than 45° from vertical and the seat position is disposed less than 590 mm behind the forward-most drive track axle.

78. The snowmobile of claim 77, wherein the angle ε is between 25° and 40° from vertical.

79. The snowmobile of claim 78, wherein the angle ε is between 30° and 35° from vertical.

80. The snowmobile of claim 79, wherein the angle ε is 33° from vertical.

81. The snowmobile of claim 77, wherein the seat position is disposed behind the forward-most drive track axle by between 550 mm and 580 mm.

82. The snowmobile of claim 81, wherein the seat position is disposed behind the forward-most drive track axle by between 560 mm and 570 mm.

83. The snowmobile of claim 82, wherein the seat position is disposed behind the forward-most drive track axle by about 565 mm.

84. A snowmobile, comprising:

a frame;

a straddle-type seat disposed on the frame;

a seat position defined by the seat;

an engine disposed on the frame in front of the seat;

a drive track disposed below the frame and connected operatively to the engine for propulsion of the snowmobile;

a forward-most drive track axle disposed on the frame;

two skis disposed on the frame;

a steering device having a steering position; and

a steering shaft operatively connecting the two skis to the steering device for steering the snowmobile, wherein the steering shaft is disposed over the engine at an angle ε of less than 45° from vertical and the steering position is disposed forward of the forward-most drive track axle.

85. The snowmobile of claim 84, wherein the angle ε is between 25° and 40° from vertical.

86. The snowmobile of claim 85, wherein the angle ε is between 30° and 35° from vertical.

87. The snowmobile of claim 86, wherein the angle ε is 33° from vertical.

88. The snowmobile of claim 84, wherein the steering position is disposed forward of the forward-most drive track axle by between 40 mm and 90 mm.

89. The snowmobile of claim 88, wherein the steering position is disposed forward of the forward-most drive track axle by between 50 mm and 80 mm.

90. The snowmobile of claim 89, wherein the steering position is disposed forward of the forward-most drive track axle by between 60 mm and 70 mm.

91. The snowmobile of claim 90, wherein the steering position is disposed forward of the forward-most drive track axle by about 65 mm.

92. A snowmobile, comprising:

a frame;

a straddle-type seat disposed on the frame;

a seat position defined by the seat;

an engine disposed on the frame in front of the seat;

a drive track disposed below the frame and connected operatively to the engine for propulsion of the snowmobile;

a forward-most drive track axle disposed on the frame;

two skis disposed on the frame;

a steering device having a steering position; and

a steering shaft operatively connecting the two skis to the steering device for steering the snowmobile, wherein the seat position is disposed less than 590 mm behind the forward-most drive track axle and the steering position is disposed forward of the forward-most drive track axle.

93. The snowmobile of claim 92, wherein the seat position is disposed between 550 mm and 580 mm behind the forward-most drive track axle.

94. The snowmobile of claim 93, wherein the seat position is disposed between 560 mm and 570 mm behind the forward-most drive track axle.

95. The snowmobile of claim 94, wherein the seat position is disposed about 565 mm behind the forward-most drive track axle.

96. The snowmobile of claim 92, wherein the steering position is disposed forward of the forward-most drive track axle by between 40 mm and 90 mm.

97. The snowmobile of claim 96, wherein the steering position is disposed forward of the forward-most drive track axle by between 50 mm and 80 mm.

98. The snowmobile of claim 97, wherein the steering position is disposed forward of the forward-most drive track axle by between 60 mm and 70 mm.

99. The snowmobile of claim 98, wherein the steering position is disposed forward of the forward-most drive track axle by about 65 mm.

100. A snowmobile, comprising:

a frame;

a straddle-type seat disposed on the frame;

a seat position defined by the seat;

an engine disposed on the frame in front of the seat;

a drive track disposed below the frame and connected operatively to the engine for propulsion of the snowmobile; and

a forward-most drive track axle disposed on the frame, wherein the seat position is disposed less than 590 mm behind the forward-most drive track axle and the frame is between about 1493 mm and 1913 mm long.

101. The snowmobile of claim 100, wherein the seat position is disposed between 550 mm and 580 mm behind the forward-most drive track axle.

102. The snowmobile of claim 101, wherein the seat position is disposed between 560 mm and 570 mm behind the forward-most drive track axle.

103. The snowmobile of claim 102, wherein the seat position is disposed about 565 mm behind the forward-most drive track axle.

104. A snowmobile, comprising:

a frame;

a straddle-type seat disposed on the frame;

a seat position defined by the seat;

an engine disposed on the frame in front of the seat;

a drive track disposed below the frame and connected operatively to the engine for propulsion of the snowmobile;

a forward-most drive track axle disposed on the frame;

two skis disposed on the frame;

a steering device having a steering position; and

a steering shaft operatively connecting the two skis to the steering device for steering the snowmobile, wherein the steering position is disposed forward of the forward-most drive track axle and the frame is between about 1493 mm and 1913 mm long.

105. The snowmobile of claim 104, wherein the steering position is disposed forward of the forward-most drive track axle by between 40 mm and 90 mm.

106. The snowmobile of claim 105, wherein the steering position is disposed forward of the forward-most drive track axle by between 50 mm and 80 mm.

107. The snowmobile of claim 106, wherein the steering position is disposed forward of the forward-most drive track axle by between 60 mm and 70 mm.

108. The snowmobile of claim 107, wherein the steering position is disposed forward of the forward-most drive track axle by 65 mm.

109. The snowmobile of claim 1, further comprising a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and a trailing arm suspension system.

110. The snowmobile of claim 26, further comprising a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and a trailing arm suspension system.

111. The snowmobile of claim 52, further comprising a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and a trailing arm suspension system.

112. The snowmobile of claim 67, further comprising a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and a trailing arm suspension system.

113. The snowmobile of claim 77, further comprising a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and a trailing arm suspension system.

114. The snowmobile of claim 84, further comprising a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and a trailing arm suspension system.

115. The snowmobile of claim 92, further comprising a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and a trailing arm suspension system.

116. The snowmobile of claim 100, further comprising:

two skis disposed on the frame; and

a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and a trailing arm suspension system.

117. The snowmobile of claim 104, further comprising a front suspension system operatively connecting the two skis to the frame, wherein the front suspension system is one of an A-arm suspension system and a trailing arm suspension system.

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

DV

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR		ATTORNEY DOCKET NO.
09/472,134	12/23/99	GIROUARD	B	PM-265136

PM92/0912

PILLSBURY MADISON AND SUTRO LLP
INTELLECTUAL PROPERTY GROUP
NINTH FLOOR
1100 NEW YORK AVENUE NW
WASHINGTON DC 20005-3918

EXAMINER	
BOEHLER, A	
ART UNIT	**PAPER NUMBER**
3618	7

DATE MAILED: 09/12/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/472,134	Girouard et al.
Examiner	**Group Art Unit**
Anne Marie Boehler	3618

☒ Responsive to communication(s) filed on *Jun 22, 2000*.

☒ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-83* is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-83* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐approved ☐disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____.

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the toe-holds, recited in claims 63, 73, and 83, and the steering shaft positioned over the engine and at an angle of less than 45 degrees from vertical, claims 50-53 (fig. 3 shows the angle, but not the engine, while fig. 14 shows the engine under a steering shaft having an angle of more than 45 degrees from vertical) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

2. The drawings are objected to because Figure 4 appears to show a position of the handlebar that is inconsistent with the snowmobile position shown in figures 2 and 3. In Figure 2, for example, the steering handlebars are shown so far forward that they almost touch the windshield. It would be impossible for the handlebars shown in Figure 2 to reach the 90 degree turn angle shown in Figure 4 because there is insufficient space behind the windshield. Correction is required.

3. The drawings are objected to because Figure 1 should be labeled "Prior Art". Correction is required.

4. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on June 22, 2000 have been disapproved because they introduce new matter into the drawings. 37 CFR 1.121(a)(6) states that no amendment may introduce new matter into the disclosure of an application. The original disclosure does not support the showing of the toe hold position, the engine positioned under a steering shaft angled less than 45 degrees from vertical, and the modified wind shield position.

5. Claims 1-49, 54-58, 61, 64-68, and 77-83 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Applicant improperly defines his invention with respect to a rider's body. In many of the claims (for example claims 1-39), applicant defines the invention with respect to the rider's center of gravity. However, the rider himself (and his body parts and center of gravity) are not statutory subject matter that may define a patentable claim. Also, every rider is different, so it would be impossible to determine the scope of the claim based on an unspecified rider.

Applicant uses terms such as "seat position", "steering position", and "footrest position" which are improperly defined in relation to the human body as well. For example, applicant explains, on page 9, line 9-15, that "the rider will be positioned on seat 128 so that he occupies seat position 130". The seat has a longitudinally elongated support surface, as seen in the drawings (fig. 2, for example) which could define a number of seat positions. Therefore, applicant has defined his "seat position" based on a "standard person" sitting a few seconds after starting the vehicle, heading straight ahead on flat terrain. The actual "seat position" is defined by a line from the rider's should to hip at its intersection point with the seat while the rider is compressing the cushioning of the seat. Therefore, the "seat position" is defined by the user, his weight and measurements at any given time, and where he chooses to position his body while riding the vehicle. This improperly incorporates the user into the claimed combination and is impermissible.

In claim 58, applicant claims to user's head position which, again, is an improper recitation of the rider.

6. Claims 1-58, 60-61, and 64-83 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In each of the independent claims, the term "type" is indefinite.

Claims 1-49, 54-58, 61, 64-68, and 77-83, which recite structural limitations with respect to their relationship to portions of a human being or "rider", are indefinite because the relationship of parts is not based on any known standard for sizing the vehicle to a rider, but rather on a rider of unspecified build. Such recitations include the "center of gravity of the snowmobile with the rider" (claims 1, 6, 36), "center of gravity of the rider" (claim 16, 20, 26, 30, 36, 61), "seat position", "footrest position", and "steering position" recited (claims 40, 44, 45, 46, 55, 64, 77, 81, and 82), "the rider space" (claim 54), and "the rider's head" (claim 58).

In claim 1, last line, "between about 0 cm and 14 cm" is indefinite because there is nothing to indicate what range of specific activity is covered by the term "about". The same indefinite recitation of a range preceded by "about" appears in claims 2-43, 45-53, 55-57, 64-80, 82, and 83.

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 40, 41, 44-49, 63, 69-76, and 81-83 are rejected under 35 U.S.C. 102(b) as being anticipated by Yasui.

Yasui shows a snowmobile with a seat position, footrest position and steering position that are illustrated by a rider shown in phantom in Figure 1. In the drawing the angles shown appear to correspond to those being claims, given a rider in the position shown. Sideboards are shown from the side in fig. 1 and in top view on fig. 3. They appear to have a 5 degree downward slope to the front and a wall that inclines upwardly to form a toe-hold, as broadly recited and disclosed.

9. Claims 50, and 54-56 are rejected under 35 U.S.C. 102(b) as being anticipated by Marier.

Marier shows a snowmobile with a frame, an engine 17, and a steering shaft 104 connected to a ski 22. The steering shaft extends above the engine at an angle of less than 45 degrees from the vertical.

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 51-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marier in view of Yoshioka.

Marier fails to show the steering handle at a 33 degree angle from vertical.

Yoshioka shows a snowmobile with a steering shaft angled at about 33 degrees from vertical and disposed above the engine 7.

It would have been obvious to a skilled artisan to angle the steering shaft at approximately 33 degrees from vertical, as taught by Yoshioka, in order to allow a more compact vehicle configuration.

12. Claims 59-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Husted in view of Boyer.

Husted shows a snowmobile with a frame 13 and a forward most drive track axle 21 which is positioned behind the steering device 25. The center of gravity of the snowmobile as shown is behind the longitudinal center of the vehicle because most of the weight (from the motor and track) is at the rear of the vehicle+. Therefore, the center of gravity of the vehicle is clearly rearward of the steering device 25, which is positioned entirely in front of the longitudinal center of the vehicle.

Husted shows only one front ski.

Boyer shows a small tracked now vehicle with a rear track and a pair of front skis.

It would have been obvious to a skilled artisan to provide the Husted vehicle with a pair of front skis, as taught by Boyer, in order to provide greater stability.

13. Claim 62 is rejected under 35 U.S.C. 102(b) as being anticipated by Karpik.

Karpik shows a snowmobile with footrests positioned, shown in figure 3, behind the steering device and below the seat.

14. Claims 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasui.

The rider position shown appears to demonstrate angles of α being about 98 degrees, β being about 44 degrees and γ being about 37 degrees. However, the angles are directly related to the exact positioning of the rider. The seat and footboards allow for a variety of positions, depending on the comfort and dimensions of the rider. Therefore, it would have been obvious for a rider who is taller than the rider shown to sit farther back on the seat, thereby altering the seat and footrest positions so they correspond to those claimed.

15. Applicant's arguments filed June 22, 2000 have been fully considered but they are not persuasive.

Applicant argues that recitation of aspects on the snowmobile relative to the rider is proper because the standard rider is defined in the specification and is merely used as a standard of measure. The examiner disagrees. Applicant has clearly avoided claiming dimensions of the snowmobile with respect to a known standard. The examiner sees no reason why, if applicant meant to claim particular dimensions of the vehicle, he did not do so. Even if the standard rider's dimensions were adequately defined in the specification, even a "standard" rider could assume different positions on a vehicle, depending on his posture, flexibility, and personal preference. Therefore, the examiner believes defining the vehicle structure based in the positioning of even a well defined "standard" rider is indefinite and the scope of the claims cannot be determined.

Applicant argues that Yasui fails to teach toe holds. However, applicant has not defined the toe holds or shown them in a way that defines over the toe abutment at the front end of the footboard that secures the foot against forward movement. Therefore, the rejection is being maintained.

Applicant argues that Marier shows a steering shaft angled at exactly 45 degrees. The examiner disagrees. The angle of the steering shaft in Figure 1 appears to be less than 45 degrees. Therefore, the limitations of claim 50 is believed to be met. Applicant also indicates that there is no teaching in Marier to make the angle any steeper than that shown. However, various steering shaft angles are shown among the prior art references. The exact angle appears to be a design choice based on the particular configuration desired. Yoshioka shows the steering shaft angle claimed. Therefore, that angling of the steering shaft does not appear to be distinguishing over the prior art.

Applicant indicates that the rejection based on the Hustead reference is moot because claim 62 has been canceled. However, claim 62 remains in the case and the rejection is being maintained.

Applicant indicates that, because Yasui is a small scaled vehicle it is not designed for a standard rider. The examiner maintains that defining the vehicle based on a "standard rider" is improper and indefinite for the reasons given above. The Yasui reference meets the claim limitations as can be determined from the claim language.

16. Applicant's arguments with respect to claims 51-53 and 59-61 have been considered but are moot in view of the new ground(s) of rejection.

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Boehler number is (703) 308-0422

amBoehler 9/11/00

ANNE MARIE BOEHLER
Primary Examiner

boehler
September 11, 2000

United States Patent [19]

Talbot

[11] **Patent Number: 4,620,604**

[45] **Date of Patent: Nov. 4, 1986**

[54] **SNOWMOBILE FRAME STRUCTURE**

[75] Inventor: **Jean-Guy Talbot, Valcourt, Canada**

[73] Assignee: **Bombardier Inc., Montreal, Canada**

[21] Appl. No.: **706,186**

[22] Filed: **Feb. 27, 1985**

[51] **Int. Cl.**[4] **B62M 27/00**

[52] **U.S. Cl.** **180/190**; 180/312

[58] **Field of Search** 180/190, 312, 291; 280/781

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,840,083	10/1974	Woods	180/312
3,877,535	4/1975	Gorski	180/190
3,882,948	5/1975	Southiere	180/190
3,985,192	10/1976	Samuelson	180/190

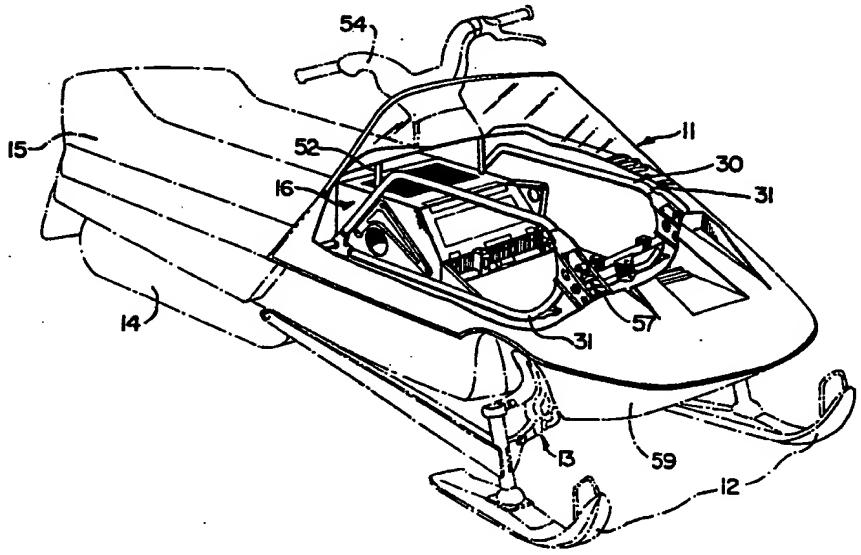
Primary Examiner—John A. Pekar

Attorney, Agent, or Firm—Larson and Taylor

[57] **ABSTRACT**

This invention relates to a new or improved snowmobile frame structure which comprises a pair of loop shaped tubular frame members extending forwardly of the track tunnel which are braced by transverse frame members welded thereto and provides support for the snowmobile engine suspension and steering components.

4 Claims, 3 Drawing Figures



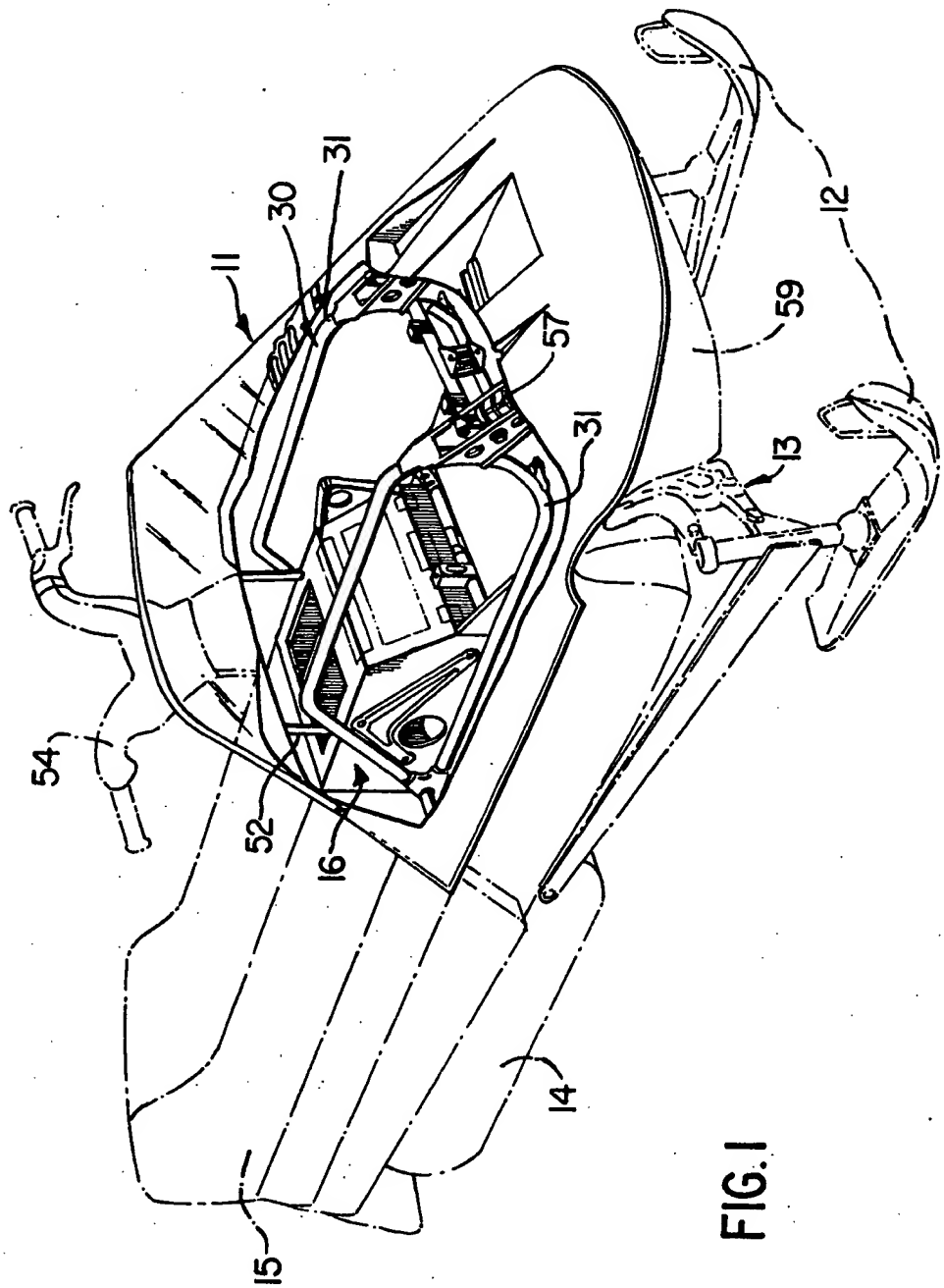


FIG. 1

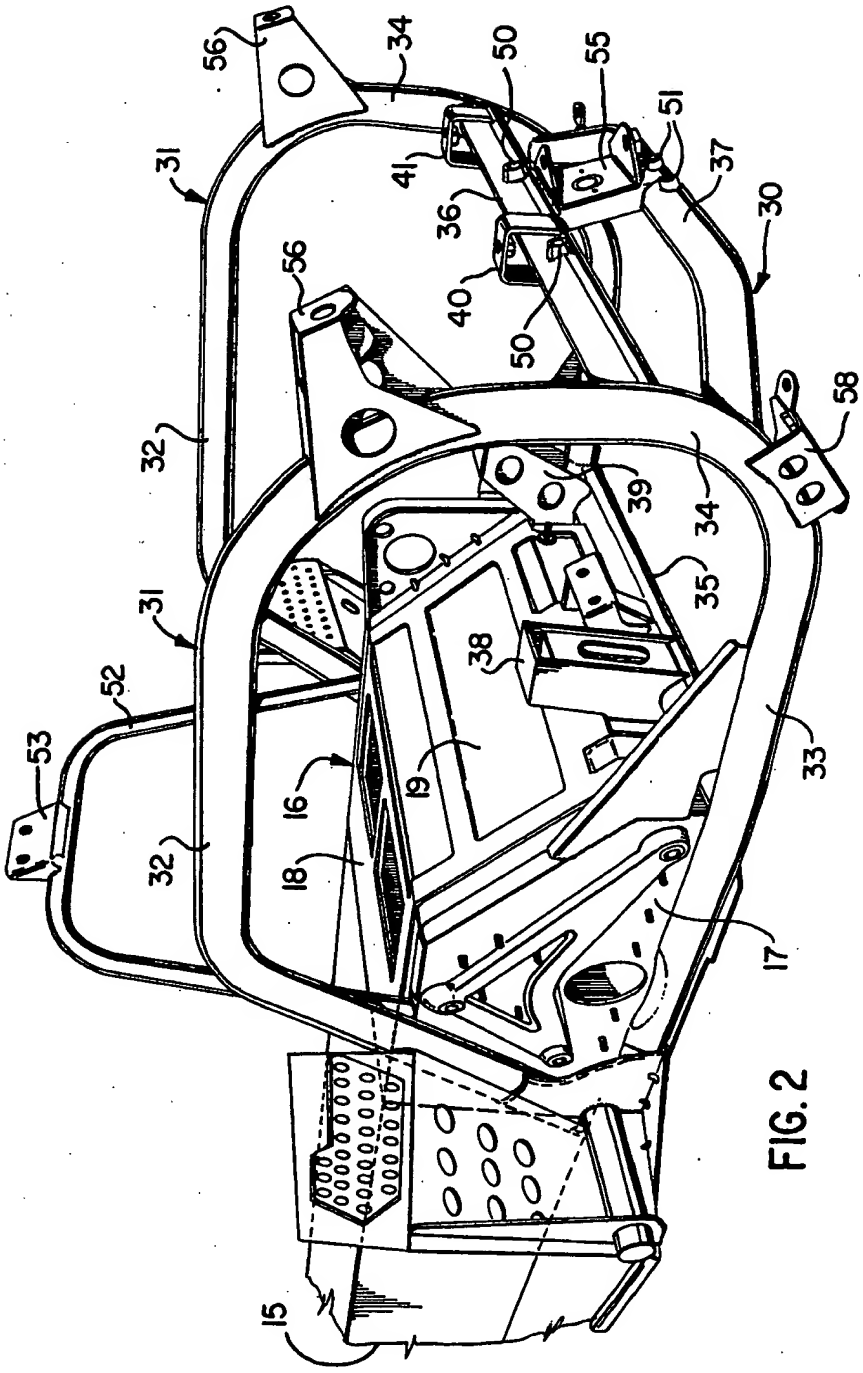

56
34
50
55
51
31
41
37
36
30
56
40
50
58
32
39
34
31
35
38
52
53
16
19
33
32
18
17
15

FIG. 2

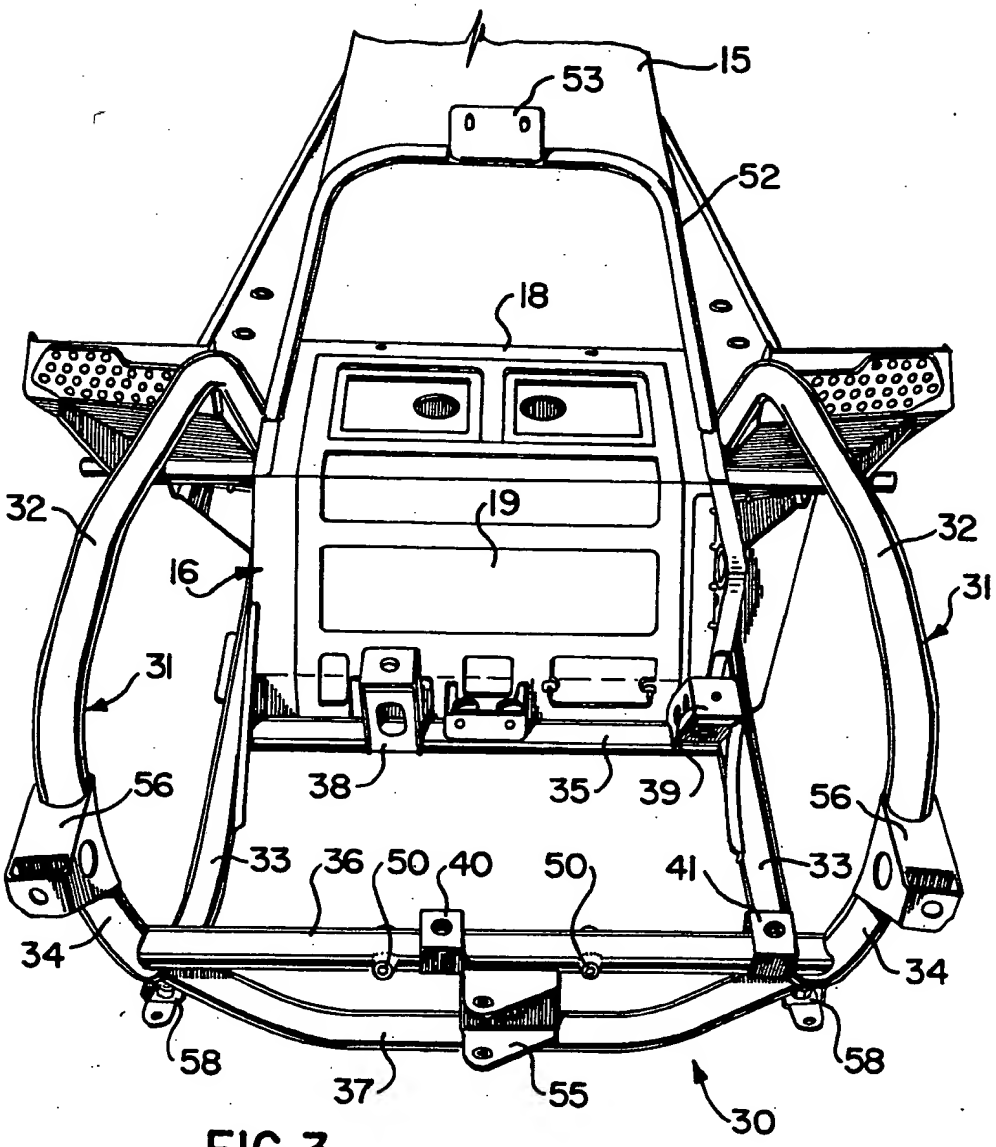


FIG. 3

SNOWMOBILE FRAME STRUCTURE

FIELD OF INVENTION

This invention relates to snowmobiles, in particular to a new or improved snowmobile frame structure.

DESCRIPTION OF THE PRIOR ART

Conventionally, the frame structure of a snowmobile has included a pair of relatively deep channel or I-section metal beams extending forwardly from opposite sides of the front of the track tunnel to form the mounting for the snowmobile engine, ski suspension, steering mechanism etc. Normally these metal beams have been welded at their lower sides to the belly pan of the front portion of the snowmobile to form an integral structure therewith. This required that the belly pan should be of steel plate, and being a rather large component, the weight of such a frame structure was relatively high. Furthermore, the metal beams provided very restricted access to the sides of the engine which was mounted therebetween.

SUMMARY OF THE INVENTION

The present invention provides an improved snowmobile frame structure which avoids the disadvantages of the frame structures previously employed.

More particularly, the invention provides a snowmobile comprising: a front portion supported on a pair of spaced steerable skis and housing an engine coupled to drive an endless track which supports the rear portion of the snowmobile and is positioned within a longitudinally extending track tunnel of inverted U-shape, wherein two transversely spaced tubular side frame units are attached to the front end of the track tunnel and extend forwardly therefrom in a generally upright disposition, said side frame units each having the form of a loop and being interconnected by transverse bracing means to form a frame structure that provides a mounting for the snowmobile engine.

This frame structure preferably also provides a mounting for the ski suspension and for the steering arrangement for the skis. Accordingly, since the belly pan of the snowmobile is not required to fulfill any structural function, it can be made of relatively thin and lightweight material. This then provides a significant weight saving, as well as added flexibility in the design and layout of steering and suspension components. The side frame units being in the form of loops, provide ready access to the snowmobile engine which is mounted between them.

In a preferred embodiment, the frame structure is a welded steel fabrication. The side frame units have rear portions that are welded to the sides of the front of the track tunnel, and the bracing means is provided by tubular elements that span the front ends of the side frame units and are welded thereto. Also welded on the frame structure are brackets that provide for the attachment of the ski suspension means and steering means.

DESCRIPTION OF THE DRAWINGS

The invention will further be described, by way of example only, with reference to the accompanying drawings wherein

FIG. 1 is a somewhat schematic perspective view of a snowmobile in accordance with the invention,

FIG. 2 is an enlarged perspective view of the frame structure of the snowmobile of FIG. 1, and

FIG. 3 is a front perspective view taken from above and showing the frame structure of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, a snowmobile 11 is supported at its front end on a pair of steerable skis 12 through suitable suspension means 13 and at its rear end on a driven track 14. The track 14 in known manner is housed within a track tunnel 15 of inverted U-shape configuration and connected thereto by a suitable suspension means (not shown).

As most clearly shown in FIGS. 2 and 3, the front portion of the track tunnel 15 is formed by a sheet steel pressing 16 suitably affixed, as by welding, to the remainder of the track tunnel. The pressing 16 has vertical side walls 17, is open on its underside (not shown) has a horizontal top wall 18, and an angled front wall 19, the lower portion of which is vertical.

The pressing 16 forms an attachment for a frame structure generally indicated at 30. The frame structure 30 comprises a pair of laterally spaced tubular steel side frame units 31 of loop-shaped configuration each of which is welded at its rear end to the associated side wall 17 of the pressing 16. Each side frame unit 31 has vertically spaced, substantially parallel upper and lower members 32,33 which merge into a convexly curved front member 34. The side frame units 31 are laterally interconnected by transversely arranged bracing means in the form of a first tubular member 35 interconnected and welded to the lower frame members 33, a second tubular member 36 spanning and interconnecting the front members 34 of the side frame units, and a third tubular member 37 spaced below the second tubular member 36 and interconnecting the side frame units in the region where the lower members 33 meet the front members 34. Thus, the side frame units 31 together with the transverse tubular members 35, 36 and 37 form a rigid open frame structure which, as will be described below, provides a mounting for the snowmobile engine and its ancilliary equipment, as well as for the skis, the ski suspension, and the steering mechanism.

The lower rear tubular member 35 has welded thereto a pair of brackets 38,39 for the attachment of rear mounts (not shown) for supporting the snowmobile engine. Similarly, the forward tubular member 36 has welded thereon a pair of engine mount supporting brackets 40 and 41.

The tubular member 36 has welded thereon a pair of threaded lugs 50, and the tubular arm 37 has formed thereon a similar pair of threaded lugs 51 to provide mountings for the arms of a parallelogram ski suspension linkage (not shown).

An inverted U-shaped tubular steel frame member 52 has lower ends welded to the pressing 16 and extends upwardly therefrom, supporting in its top portion a welded on bracket 53 to support a bearing mechanism (not shown) for the handle bars 54 of the steering mechanism. A further bracket 55 welded between the tubular members 36 and 37 forms a bearing arrangement for linkage members (not shown) of the steering mechanism.

Further brackets 56 welded to the front members 34 of the side frame units 31 provide mountings for the hydraulic damper units 57 of the ski suspension.

Further brackets 58 at the lower front portions of the side frame units 31 provide a means for attachment of the belly pan 59 to the snowmobile frame structure.

The snowmobile frame structure as above described has several advantages when compared with previously used arrangements. Thus, the large open loop shaped side frame units 31 provide ready access to the engine and other components which are mounted therebetween. The side frame units 31 are relatively light and yet very strong. They are readily adaptable to different engine and suspension configurations by using different arrangements of the transverse tubular members and of the various brackets which are provided to form supports for the engine suspension and steering components.

Since the belly pan is no longer a structural component of the snowmobile frame, the relatively heavy and expensive pressed metal belly pan as previously used can be dispensed with and replaced by a lightweight member, e.g. of glass fiber or plastic.

The improved frame structure is cheap, and yet provides very high resistance to bending and torsional stress, and provides an easy and flexible manner of attaching various accessories.

What is claimed is:

1. A snowmobile comprising: a front portion supported on a pair of spaced steerable skis and housing an engine coupled to drive an endless track which supports the rear portion of the snowmobile and is positioned within a longitudinally extending track tunnel of inverted U-shape, wherein two transversely spaced tubular side frame units form a rigid attachment to the front end of the track tunnel to be integral therewith and extend forwardly therefrom in a generally upright disposition, said side frame units being interconnected by transverse bracing means to form a frame structure that provides a mounting for the snowmobile engine, each said side frame unit comprising one continuous length of tube that is bent to form a closed loop.

2. A snowmobile according to claim 1 wherein said frame structure also provides a mounting for a suspension means for said skis and for a ski steering means.

3. A snowmobile according to claim 1 wherein said frame structure is a welded steel fabrication, said frame units having rear portions welded to the sides of the front of the track tunnel and said bracing means comprising at least one tubular element spanning the front ends of the side frame units and welded thereto.

4. A snowmobile frame structure according to claim 3 including brackets welded on said frame structure for the attachment of steering means and suspension means for said skis.

* * * * *

US006125958A

United States Patent [19]

Olson et al.

[11] Patent Number: 6,125,958

[45] Date of Patent: Oct. 3, 2000

[54] SNOWMOBILE FRONT SUSPENSION

[75] Inventors: Jerry A. Olson, Roseau; Jeffrey A. Eaton, Wannaska, both of Minn.

[73] Assignee: Polaris Industries Inc., Minneapolis, Minn.

[21] Appl. No.: 08/947,984

[22] Filed: Oct. 9, 1997

[51] Int. Cl.[7] B62B 13/08

[52] U.S. Cl. 180/182; 180/190

[58] Field of Search 180/182, 190; 280/124.128, 124.132, 124.148, 124.135, 124.145, 124.146, 16, 17, 22, 22.1, 21.1, 14.3

[56] References Cited

U.S. PATENT DOCUMENTS

4,641,854	2/1987	Masuda et al.	280/701
4,671,521	6/1987	Talbot et al.	280/21.1
4,892,165	1/1990	Yasui et al.	180/190
5,029,664	7/1991	Zulawski	180/190
5,503,242	4/1996	Jeffers	180/190

FOREIGN PATENT DOCUMENTS

1227823	10/1987	Canada	305/38
5290	1/1991	Japan	180/190
7674	1/1991	Japan	180/190
6080093	3/1994	Japan	180/190

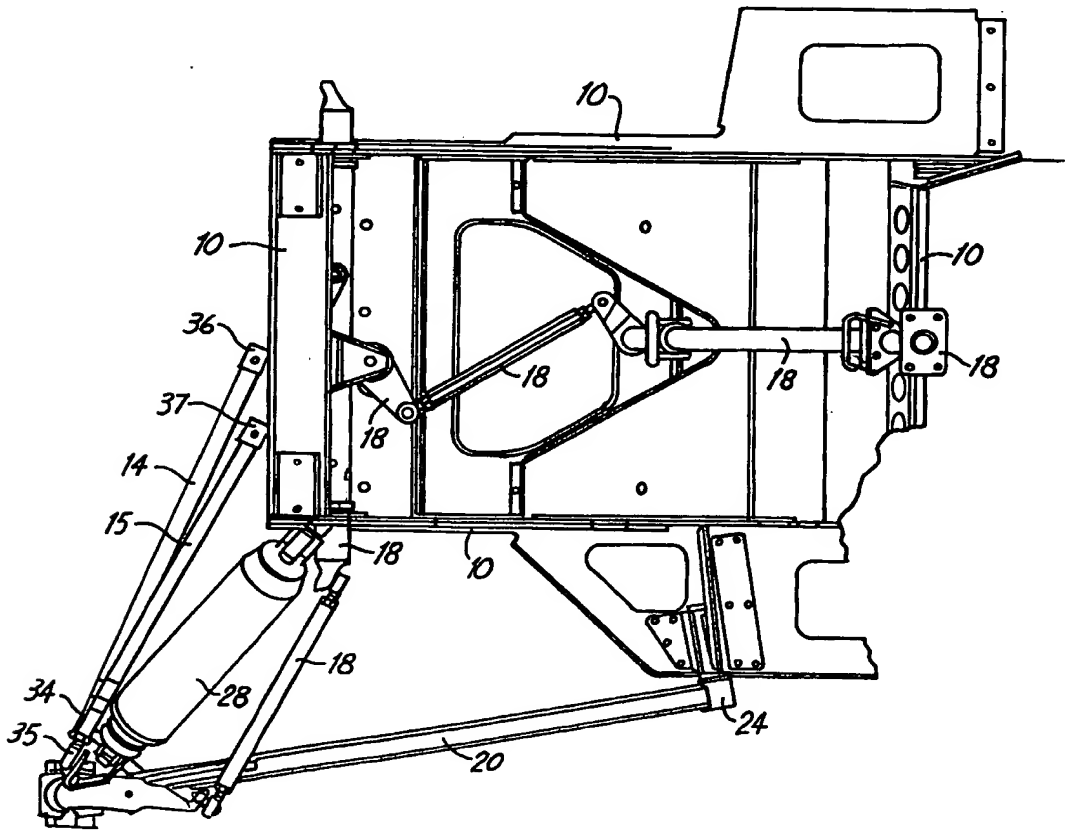
Primary Examiner—Anne Marie Boehler

Attorney, Agent, or Firm—Fredrikson & Byron, P.A.

[57] ABSTRACT

A front snowmobile suspension of the type having a ski carried at the front end of a trailing arm. The rear end of the trailing arm is pivotably secured to the chassis and the front end of the trailing arm is pivotably secured to the chassis by a pair of generally transversely mounted radius rods which in turn are pivotably secured to the chassis. Each radius rod has an inner end pivotably attached to the chassis and an outer end pivotably attached to the front end of the trailing arm. The outer ends of the radius rods are positioned forwardly of the inner ends of the radius rods a sufficient distance that the radius rods, viewed from the top, form an angle of at least about 15° with respect to a transverse plane that is perpendicular to the chassis centerline.

7 Claims, 3 Drawing Sheets



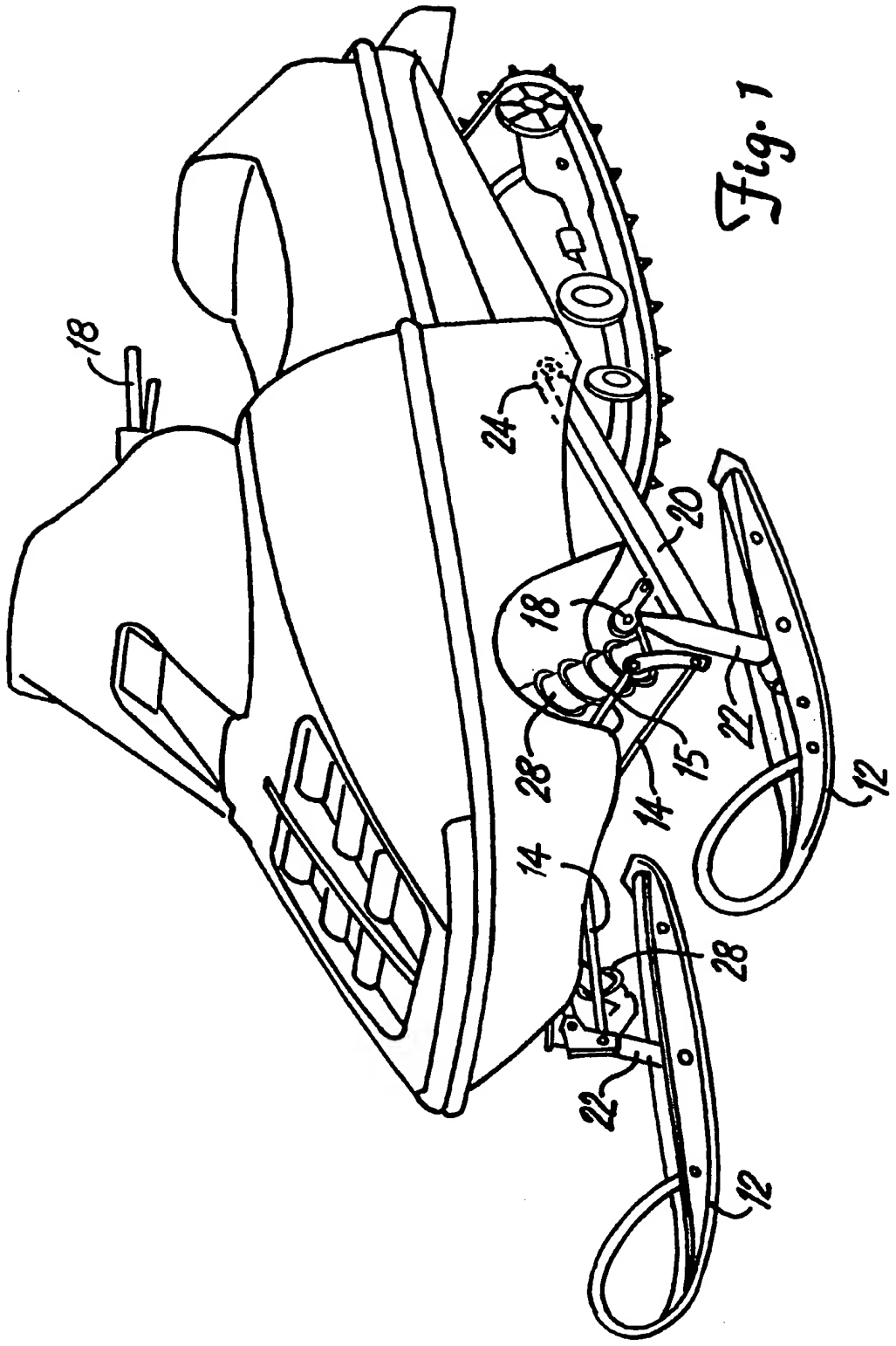


Fig. 1

Fig. 2

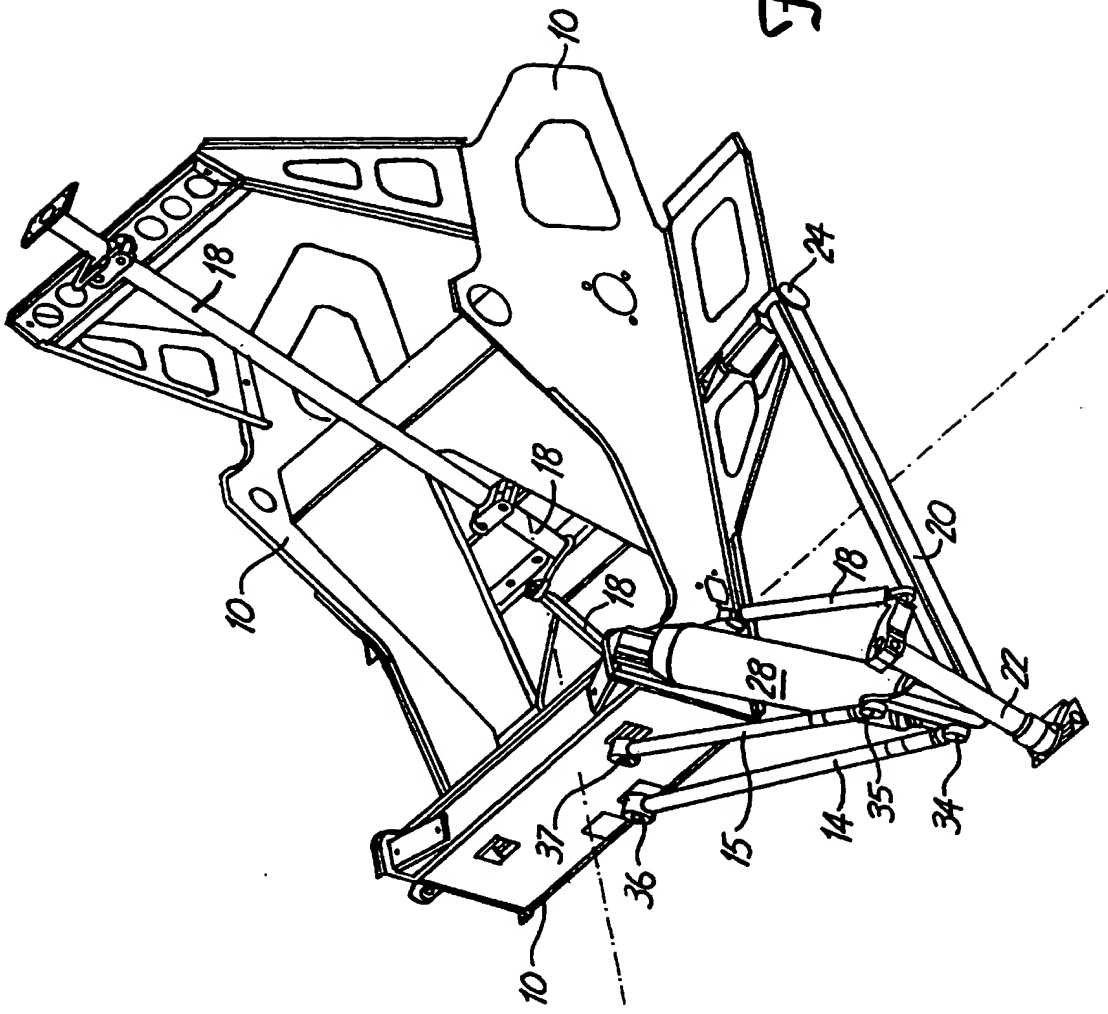
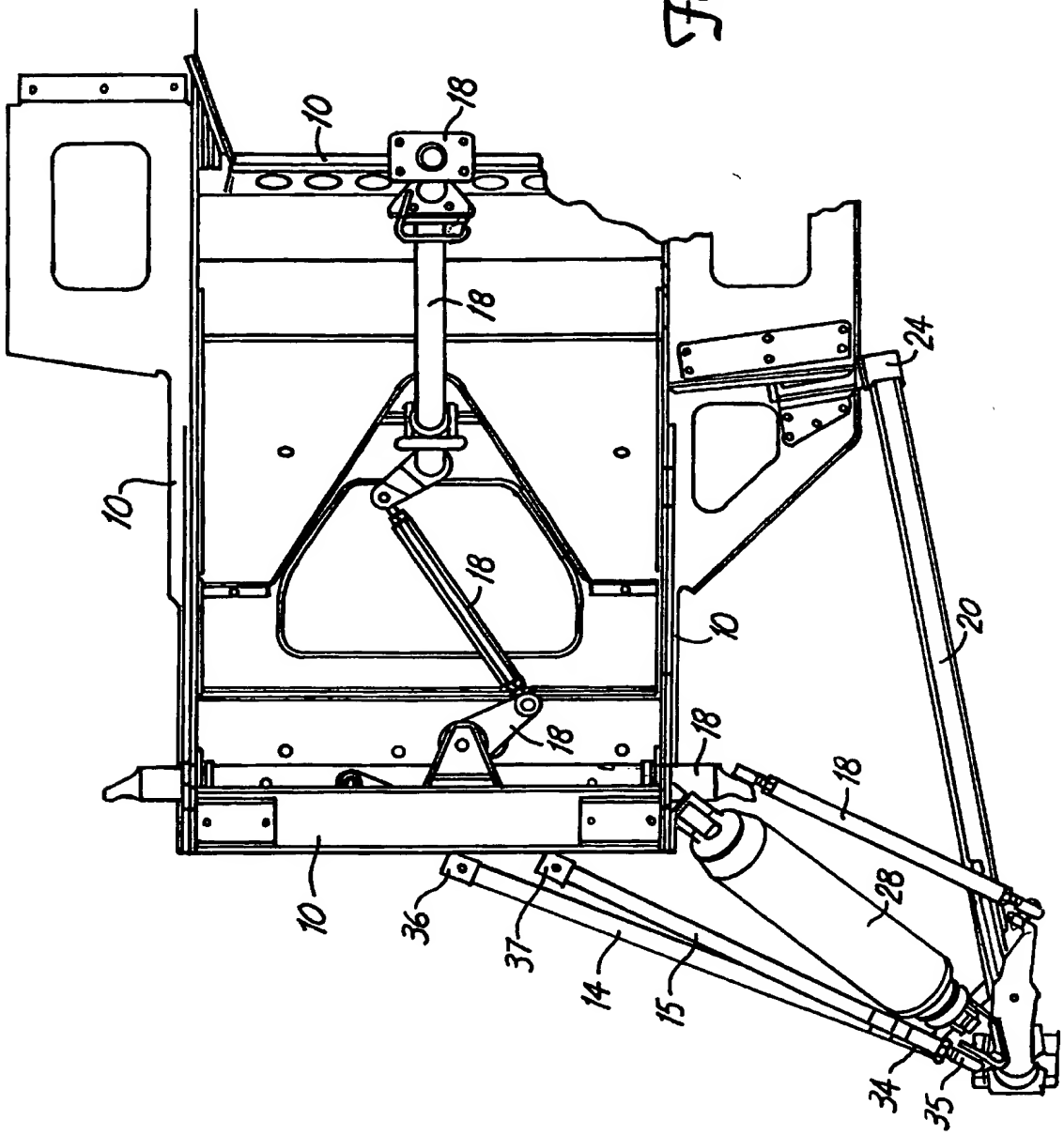


Fig. 3



SNOWMOBILE FRONT SUSPENSION

TECHNICAL FIELD

The invention relates to snowmobile front suspension systems, and, in particular, to improvements in independent front suspension systems of the type employing a rear trailing arm and a pair of transversely mounted radius rods.

BACKGROUND OF THE INVENTION

A variety of front suspension systems have been employed on snowmobiles over the years. In the early 1980's the assignee of the present invention introduced to the snowmobiling industry an independent front suspension system utilizing a trailing arm—i.e., an elongated arm having its front end connected to the steering spindle, and the rear end pivotably connected to the chassis (see, e.g., Canadian Pat. No. 1,227,823, the contents of which are hereby incorporated by reference). The trailing arm is oriented generally parallel to the snowmobile's longitudinal centerline, its front end being secured to the chassis by a pair of generally transversely mounted radius rods.

While the trailing arm/radius rod suspension system has been widely accepted in the snowmobile industry as a very good snowmobile front suspension design, applicants have found that further improvements in the system can be made, providing even better performance advantages for the rider.

SUMMARY OF THE INVENTION

The invention provides a front snowmobile suspension of the type having a ski spindle extending upwardly from a ski, the ski spindle being pivotably carried by the front end of a trailing arm. The rear end of the trailing arm is pivotably secured to the chassis and the front end of the trailing arm is pivotably connected to a pair of generally transverse radius rods which in turn are pivotably secured to the chassis. Each radius rod has an inner end pivotably attached to the chassis and an outer end pivotably attached to the front end of the trailing arm. The radius rods permit upward and downward movement of the front end of the trailing arm. The outer ends of the radius rods are positioned forwardly of the inner ends of the radius rods a sufficient distance that the radius rods, viewed from the top, form an angle of at least about 15° with respect to a transverse plane that is perpendicular to the chassis centerline. This unique positioning of the radius rods arm has been found to reduce lateral scrub of the skis as they move upwardly and downwardly through their respective ranges of motion.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a snowmobile incorporating the front suspension of the invention;

FIG. **2** is a perspective view of a portion of the chassis of a snowmobile illustrating attachment of the front suspension of the invention to the chassis; and

FIG. **3** is a top view of the portion of the chassis shown in FIG. **2**.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** depicts generally a snowmobile having a front suspension of the invention, and FIGS. **2–3** provide further details regarding the components of the suspension. The chassis **10** of the snowmobile (concealed by body panels and other snowmobile components in FIG. **1**) provides a basic framework to which the various components of the suspension system of the invention may be mounted. As indicated above, the suspension system is generally considered to be an independent suspension system since the left and right skis are permitted to move upwardly and downwardly generally independently of each other (in many cases, however, it is desirable to connect the two sides through a torsion bar, as is described in detail in the Canadian patent identified above). Thus, each side of the suspension system is essentially a mirror image of the other, and the following discussion of the system will be with reference to the left side of the system, as shown in detail in FIGS. **2–3**.

The ski **12** is secured to an upwardly extending spindle. The spindle in turn is rotatably disposed within (and, in the drawings, concealed by) a generally cylindrical sleeve **22** carried at the front end of the trailing arm **20**. The spindle is rotated by a steering linkage system (various components of which are identified by the common reference number **18** in the drawings) to cause the ski to turn in the desired direction.

The front end of the trailing arm **20** is linked to the chassis **10** by a pair of radius rods **14** and **15** which are oriented generally transversely to the centerline "C" of the snowmobile. The radius rods have pivotable joints on each end to permit the front end of the trailing arm **20** to move upward and downward. The rear end **24** of the trailing arm **20** is also pivotably mounted to the chassis in such a fashion as to permit the front end of the trailing arm **20** to move upward and downward. The combination of the radius rods **14** and **15** and the trailing arm **20** thus provide a geometrically stable mounting structure for the ski **12**. A suitable shock absorber **28** and coil spring typically is connected from the front end of the trailing arm **20** to the chassis **10** to provide the suspension with the desired suspension characteristics.

To provide enhanced performance for the suspension the outer ends **34** and **45** of the radius rods **14** and **15** are mounted substantially further forwardly of the inner ends **36** and **37** of the radius rods **14** and **15** than in prior art trailing arm suspension systems. Consequently, the radius rods **14** and **15** are set at an angle α with respect to a transverse plane that is perpendicular to the centerline "C"; desirably a is at least about 15°, and preferably α is at least about 20°. A particularly preferred embodiment illustrated in the drawings has radius rods **14** and **15** with unequal length—the shorter radius rod **15** preferably forms an angle α of at least about 25°. (In FIG. **3**, the shorter radius rod **15** forms an angle α of about 28°, and the longer radius rod **14** forms an angle α of about 22°.) As can be seen in FIG. **3**, the pivot axes of the inner ends **36** and **37** of the radius rods **14** and **15** similarly are set at a corresponding angle to the centerline "C."

By moving the outer ends **34** and **35** of the radius rods **14** and **15** forwardly in comparison to prior art trailing arm suspensions the suspension system allows the ski to move upwardly and downwardly with less lateral scrub. That is, because the radius rods **14** and **15** cause the front end of the trailing arm **20** (and, thus, the ski **12**) to move through a broad arc as the ski and suspension move up and down with respect to the chassis **10**, if viewed from the front one would see that the ground-contacting surface of the skis move laterally in and out a small distance as the ski travels through this arc. This lateral movement is generally referred to as scrub. The improvements of the present invention allow the ski to move through the same arc length with substantially less lateral scrub, which therefore provides better handling and less loading on the suspension components. Part of this advantage relates to the additional length of the radius rods that this geometry permits (i.e., if the skis are kept the same

distance apart as in a prior art snowmobile, the angling of the radius rods permits the rods to be longer without increasing this width), and part of the advantage is due directly to the angled geometry of the system (i.e., scrub would be reduced by angling the radius rods, even if they were kept the same length).

While a preferred embodiment of the present invention has been described, it should be understood that various changes, adaptations and modifications may be made therein without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. A snowmobile comprising;

a chassis having a longitudinal centerline, and a pair of skis, each ski being secured to the chassis by a ski suspension system including

a ski spindle extending upwardly from the ski,

a generally longitudinally extending trailing arm having front and rear ends, the front end of the trailing arm including a generally cylindrical sleeve for pivotably receiving the ski spindle therein, and the rear end of the trailing arm being pivotably secured to the chassis;

a pair of generally transversely mounted radius rods, each radius rod having an inner end pivotably attached to the chassis and an outer end pivotably attached to the front end of the trailing arm;

the outer ends of the radius rods being positioned forwardly of the inner ends of the radius rods a sufficient distance that the radius rods, viewed from the top, form an angle of at least 15° with respect to a transverse plane that is perpendicular to the chassis centerline.

2. The snowmobile of claim 1 wherein the outer ends of the radius rods are positioned forwardly of the inner ends of the radius rods a sufficient distance that the radius rods, viewed from the top, form an angle of at least 20° with respect to a transverse plane that is perpendicular to the chassis centerline.

3. The snowmobile of claim 1 wherein the pivot axes of the inner ends of the radius rods each form an angle of at least 15° with respect to the chassis centerline.

4. The snowmobile of claim 1 wherein the pivot axes of the inner ends of the radius rods each form an angle of at least 20° with respect to the chassis centerline.

5. The snowmobile of claim 1 wherein the outer end of at least one of the radius rods is positioned forwardly of the inner end of such radius rod a sufficient distance that the radius rod, viewed from the top, forms an angle of at least 25° with respect to a transverse plane that is perpendicular to the chassis centerline.

6. A snowmobile comprising a chassis having a longitudinal centerline and a pair of skis, each ski being secured to the chassis by a trailing arm, having front and rear ends, and a pair of radius rods which each have an inner end and an outer end, the outer ends of the radius rods being connected to the front end of the trailing arm and being positioned forwardly of the inner ends of the radius rods a sufficient distance that the radius rods, viewed from the top, each form an angle of at least 15° with respect to a transverse plane that is perpendicular to the chassis centerline.

7. A snowmobile comprising;

a chassis having a longitudinal centerline, and a pair of skis, each ski being secured to the chassis by a ski suspension system including

a ski spindle extending upwardly from the ski,

a generally longitudinally extending trailing arm having front and rear ends, the front end of the trailing arm including a generally cylindrical sleeve for pivotably receiving the ski spindle therein, and the rear end of the trailing arm being pivotably secured to the chassis;

a pair of generally transversely mounted radius rods, each radius rod having an inner end pivotably attached to the chassis and an outer end pivotably attached to the front end of the trailing arm;

the outer ends of the radius rods being positioned forwardly of the inner ends of the radius rods a sufficient distance that one of the radius rods, viewed from the top, forms an angle of at least 20° with respect to a transverse plane that is perpendicular to the chassis centerline, and the other radius rod, viewed from the top, forms an angle of at least 25° with respect to a transverse plane that is perpendicular to the chassis centerline, the pivot axis of the inner ends of the radius rods forming an angle of at least 20° with respect to the chassis centerline.

* * * * *

US006343666B1

(12) **United States Patent**
Olson et al.

(10) **Patent No.: US 6,343,666 B1**
(45) **Date of Patent: *Feb. 5, 2002**

(54) **SNOWMOBILE FRONT SUSPENSION**

(75) Inventors: **Jerry A. Olson**, Roseau; **Richard H. Bates, Jr.**, Badger, both of MN (US)

(73) Assignee: **Polaris Industries Inc.**, Minneapolis, MN (US)

(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **08/947,983**

(22) Filed: **Oct. 9, 1997**

(51) **Int. Cl.**[7] **B62M 27/02**
(52) **U.S. Cl.** **180/182**; 180/190
(58) **Field of Search** 180/182, 190, 180/186; 280/124, 148, 21.1

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,372,567	A *	2/1983	Yasui et al.	280/21.1
4,620,604	A *	11/1986	Talbot	180/190
4,633,964	A *	1/1987	Boyer et al.	280/21.1
4,671,521	A *	6/1987	Talbot et al.	180/190
5,242,176	A *	9/1993	Hendrickson	280/25
5,251,718	A *	10/1993	Inagawa et al.	180/190
5,443,278	A *	8/1995	Berto	280/21.1
5,613,570	A *	3/1997	Becker	180/190
5,720,312	A *	2/1998	Scheuermann	135/88.09
5,957,230	A *	9/1999	Harano et al.	180/68.4
6,009,966	A *	1/2000	Olson et al.	180/182

FOREIGN PATENT DOCUMENTS

CA	1227823	10/1987	305/38

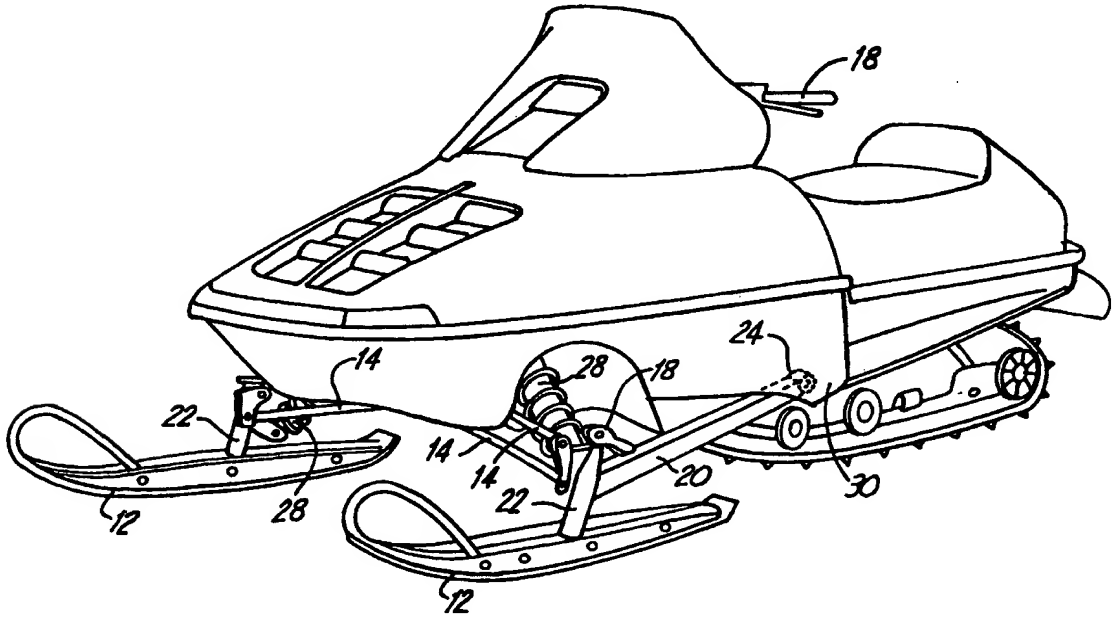
* cited by examiner

Primary Examiner—Brian L. Johnson
Assistant Examiner—Avraham H. Lerner
(74) *Attorney, Agent, or Firm*—Fredrikson & Byron, P.A.

(57) **ABSTRACT**

A front snowmobile suspension of the type having a ski carried at the front end of a trailing arm. The front end of the trailing arm is pivotably secured to the chassis by a pair of generally transversely mounted radius rods. The rear end of the trailing arm is pivotably secured to the chassis at a position sufficiently closer to the chassis centerline than the front end of the trailing arm that the trailing arm is oriented at an angle of at least about 8°, and preferably at least about 10°, with respect to the chassis centerline. In this location the rear end of the trailing arm may be positioned inboard of at least a portion of a body panel (typically the side panel)—i.e. the rear end of the trailing arm is disposed between the body panel and the centerline of the chassis.

17 Claims, 3 Drawing Sheets



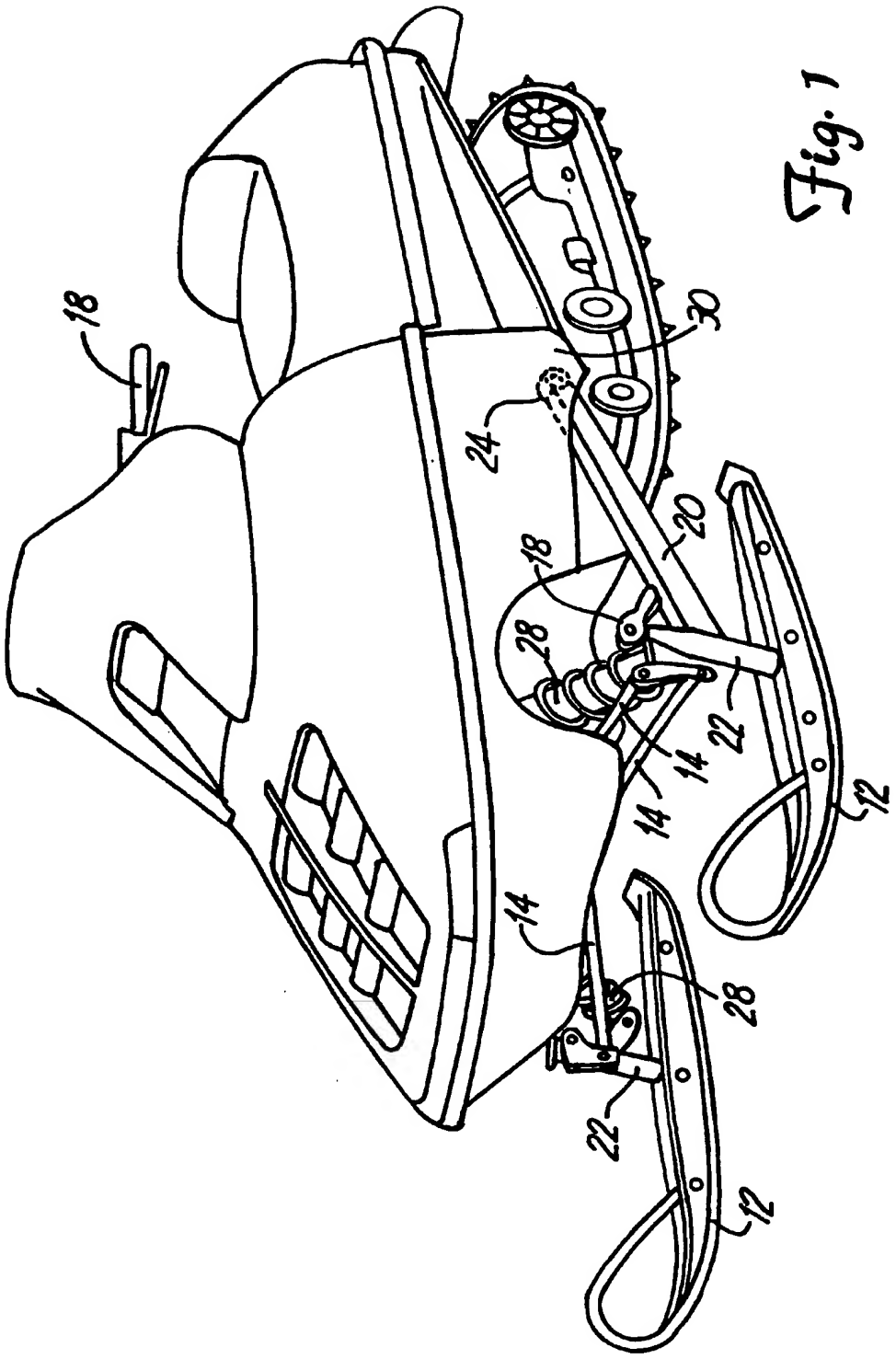


Fig. 1

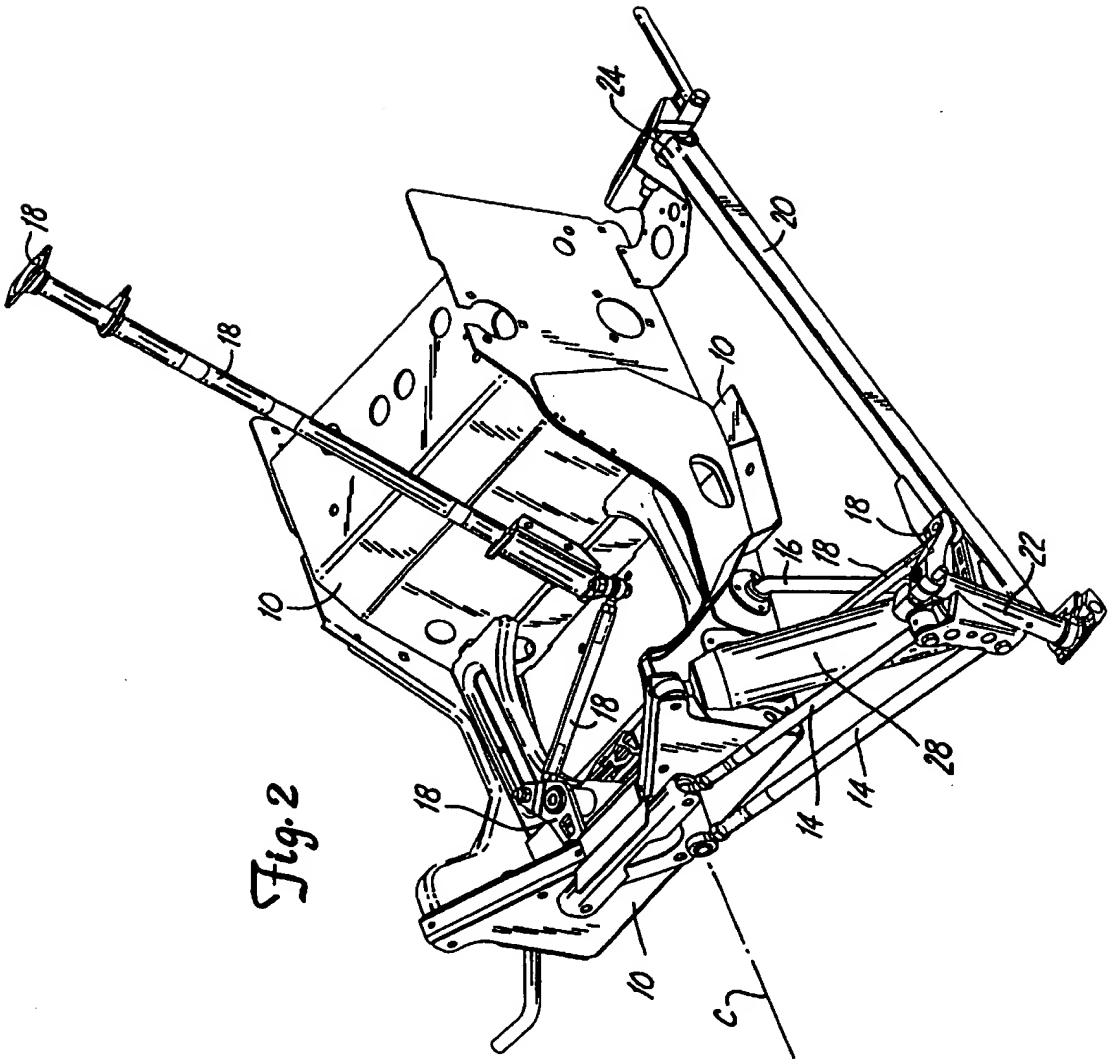
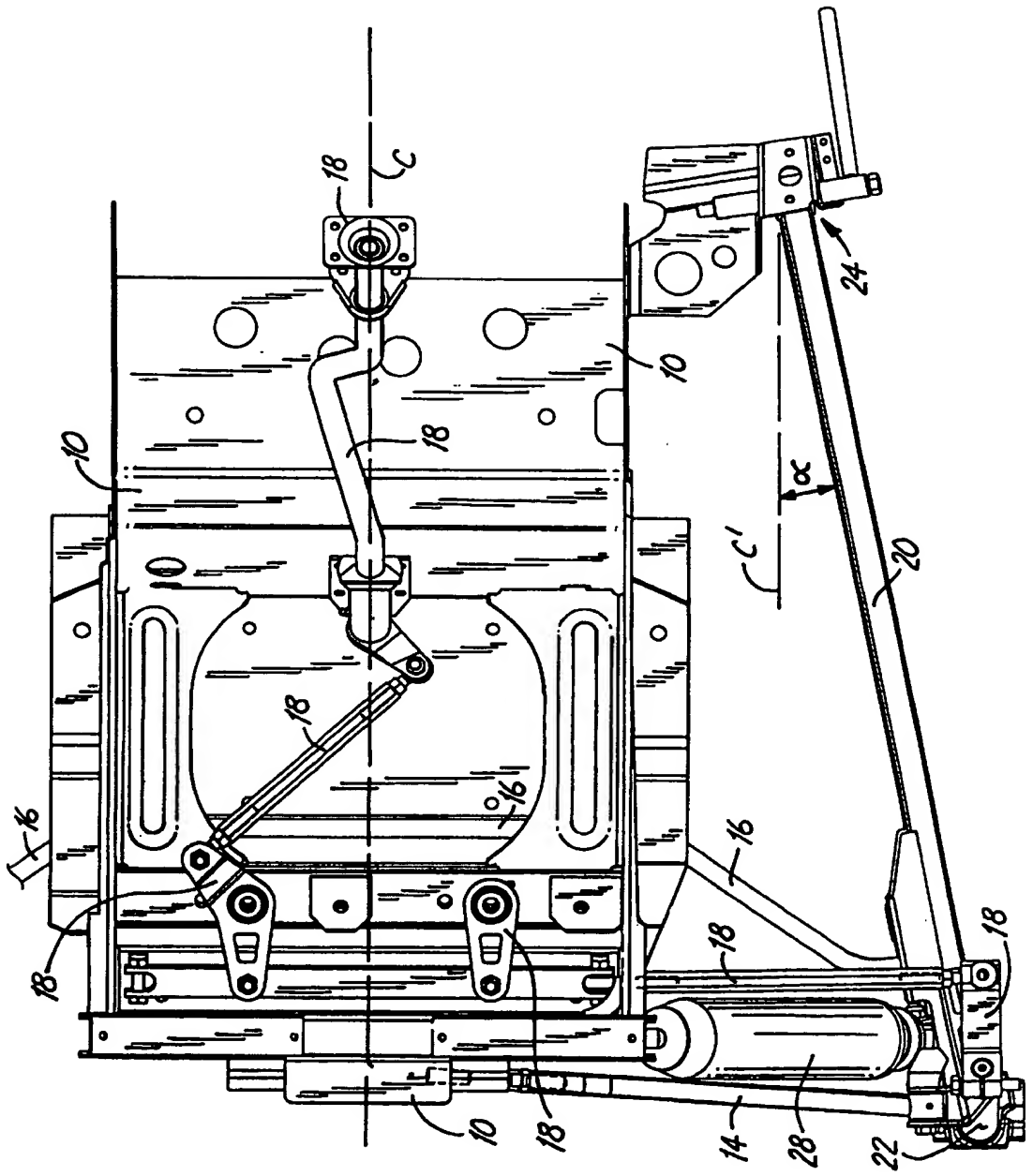


Fig. 2

Fig. 3



SNOWMOBILE FRONT SUSPENSION

TECHNICAL FIELD

The invention relates to snowmobile front suspension systems, and, in particular, to improvements in independent front suspension systems of the type employing a rear trailing arm.

BACKGROUND OF THE INVENTION

A variety of front suspension systems have been employed on snowmobiles over the years. In the early 1980's the assignee of the present invention introduced to the snowmobiling industry an independent front suspension system utilizing a trailing arm—i.e., an elongated arm having its front end connected to the steering spindle, and the rear end pivotably connected to the chassis (see, e.g., Canadian Pat. No. 1,227,823). The trailing arm is oriented generally parallel to the snowmobile's longitudinal centerline, being angled inwardly at the rear end by only about, e.g., 5°, reflecting the fact that the ski stance desirably is slightly wider than the body of the snowmobile.

While the trailing arm suspension system has been widely accepted in the snowmobile industry as a very good snowmobile front suspension design, applicants have found that further improvements in the system can be made, providing even greater stability and performance advantages for the rider.

SUMMARY OF THE INVENTION

The invention provides a front snowmobile suspension of the type having a ski spindle extending upwardly from a ski, the ski spindle being pivotably carried by the front end of a trailing arm. The front end of the trailing arm is pivotably secured to the chassis by a pair of generally transversely mounted radius rods; each radius rod has an inner end pivotably attached to the chassis and an outer end pivotably attached to the front end of the trailing arm. The radius rods permit upward and downward movement of the front end of the trailing arm. The rear end of the trailing arm is pivotably secured to the chassis at a position sufficiently closer to the chassis centerline than the front end of the trailing arm so that the trailing arm is oriented at an angle of at least about 8°, and preferably at least about 10°, with respect to the chassis centerline. At this location the rear end of the trailing arm may be positioned inboard of at least a portion of a body panel (typically the side panel)—i.e. the rear end of the trailing arm is disposed between the body panel and the centerline of the chassis. This unique positioning of the trailing arm has been found to provide increased stability and performance advantages for the rider.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a snowmobile incorporating the front suspension of the invention;

FIG. 2 is a perspective view of a portion of the chassis of a snowmobile illustrating attachment of the front suspension of the invention to the chassis; and

FIG. 3 is a top view of the portion of the chassis shown in FIG. 2.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 depicts generally a snowmobile having a front suspension of the invention, and FIGS. 2–3 provide further details regarding the components of the suspension. The chassis **10** of the snowmobile (concealed by body panels and other snowmobile components in FIG. **1**) provides a basic framework to which the various components of the suspension system of the invention may be mounted. As indicated above, the suspension system is generally considered to be an independent suspension system since the left and right skis are permitted to move upwardly and downwardly generally independently of each other (in many cases, however, it is desirable to connect the two sides through a torsion bar, as is described in detail in the Canadian patent identified above). Thus, each side of the suspension system is essentially a mirror image of the other, and the following discussion of the system will be with reference to the left side of the system, as shown in detail in FIGS. **2–3**.

The ski **12** is secured to an upwardly extending spindle. The spindle in turn is rotatably disposed within (and, in the drawings, concealed by) a generally cylindrical sleeve **22** carried at the front end of the trailing arm **20**. The spindle is rotated by a steering linkage system (various components of which are identified by the common reference number **18** in the drawings) to cause the ski to turn in the desired direction.

The front end of the trailing arm **20** is linked to the chassis **10** by a pair of radius rods **14** which are oriented generally transversely to the centerline "C" of the snowmobile. The radius rods have pivotable joints on each end to permit the front end of the trailing arm **20** to move upward and downward. The rear end **24** of the trailing arm **20** is also pivotably mounted to the chassis in such a fashion as to permit the front end of the trailing arm **20** to move upward and downward. The combination of the radius rods **14** and the trailing arm **20** thus provide a geometrically stable mounting structure for the ski **12**. A suitable shock absorber **28** and coil spring typically is connected from the front end of the trailing arm **20** to the chassis **10** to provide the suspension with the desired suspension characteristics.

To provide enhanced stability and performance for the suspension the rear end **24** of the trailing arm **20** is mounted substantially further inwardly (i.e., closer to the centerline "C") of the front end of the trailing arm than in prior art trailing arm suspension systems. Consequently, the trailing arm **20** is set at an angle α with respect to the centerline "C"; desirably a is at least about 8°, and preferably a is at least about 10°. Applicants have achieved very good results using both 10° and 11°. When moved inwardly to this position the rear end **24** of the trailing arm **20** may conveniently be concealed behind a portion of the side panel **30** of the snowmobile body. That is, the adjacent body panel, which constitutes a portion of the overall body panels surrounding the chassis, extends downwardly around the outside surface of the rear end **24** of the trailing arm **20**, placing the rear end **24** of the trailing arm **20** between this portion of the body panel and the centerline "C" of the snowmobile so that, viewed from the side, the rear end **24** of the trailing arm is concealed by the portion of the body panel **30**.

By moving the rear end **24** of the trailing arm **20** inboard in comparison to prior art trailing arm suspensions the suspension system is afforded greater stability and better performance for the rider. Whenever the ski encounters an object during operation, whether the object be a chunk of snow or ice, a mogul, or any other object over which the ski passes, the suspension system is designed to permit the ski to travel over the object while providing a relatively smooth, controlled ride to the driver. Some of the force of the

perturbance is absorbed by vertical displacement of the ski; the radius rods, trailing arm, shock absorber and spring all permit the ski to move upwardly with respect to the snowmobile chassis (the shock and spring predominantly absorbing this force). Some of the force of the perturbance, however, is absorbed as a longitudinal force by the trailing arm **20**. Because the trailing arm is generally parallel to the centerline "C" of the snowmobile, and its rear end is mounted to the side of the chassis, the longitudinal force results in a high yaw moment load on the chassis. If both skis encounter the same object at the same time, the respective yaw moments typically cancel each other. If either ski experiences a perturbance that is not exactly mirrored by the other ski, however, the chassis realizes a resultant yaw moment. Thus, Applicants have discovered that they can reduce the yaw moment by moving the rear end **24** of the trailing arm **20** inward (i.e., toward the centerline "C" and the center of gravity of the snowmobile), thereby providing better handling characteristics to the rider.

While a preferred embodiment of the present invention has been described, it should be understood that various changes, adaptations and modifications may be made therein without departing from the spirit of the invention and the scope of the appended claims.

What is claimed is:

1. A snowmobile comprising;

a chassis, having a longitudinal centerline, and a pair of skis, each ski being secured to the chassis by a ski suspension system including

a ski spindle extending upwardly from the ski,

a trailing arm having front and rear ends, the front end of the trailing arm including a generally cylindrical sleeve for pivotably receiving the ski spindle therein, the rear end of the trailing arm being pivotably secured to the chassis, and

a pair of radius rods mounted generally transverse to the longitudinal centerline of the chassis, each radius rod having an inner end pivotably attached to the chassis and an outer end pivotably attached to the front end of the trailing arm; and

an integral body panel enclosing and conforming to at least a portion of the chassis, the trailing arm being angled outwardly from the chassis' centerline such that the front end of the trailing arm is spaced farther from the centerline than the rear end of the trailing arm and, viewed from the side, the front end of the trailing arm being visible while the rear end of the trailing arm is concealed by a portion of the body panel.

2. The snowmobile of claim **1** wherein the rear end of the trailing arm is pivotably secured to the chassis at a position such that, viewed from above, the trailing arm forms an angle of at least 8° with respect to the chassis centerline.

3. The snowmobile of claim **1**, wherein the rear end of the trailing arm is pivotably secured to the chassis at a position such that the trailing arm is oriented at an angle of at least 10° with respect to the chassis centerline.

4. A snowmobile comprising a chassis having a longitudinal centerline, a pair of skis, each ski being secured to the chassis by one or more radius rods and a trailing arm having front and rear ends, and an integral body panel enclosing and conforming to at least a portion of the chassis, the trailing arm being angled outwardly from the chassis' centerline such that the front end of the trailing arm is spaced farther from the centerline than the rear end of the trailing arm and, viewed from the side, the front end of the trailing arm being visible while the rear end of the trailing arm is concealed by a portion of the body panel.

5. The snowmobile of claim **4**, wherein at least a portion of the body panel covers an outside surface of the rear end of the trailing arm.

6. The snowmobile of claim **4** wherein the rear end of the trailing arm is pivotably secured to the chassis at a position such that, viewed from above, the trailing arm forms an angle of at least 8° with respect to the chassis centerline.

7. The snowmobile of claim **4** wherein the rear end of the trailing arm is pivotably secured to the chassis at a position such that the trailing arm is oriented at an angle of at least 10° with respect to the chassis centerline.

8. A snowmobile comprising;

a chassis, having a longitudinal centerline, and a pair of skis, each ski being secured to the chassis by a ski suspension system including

a ski spindle extending upwardly from the ski,

a trailing arm having front and rear ends, the front end of the trailing arm including a generally cylindrical sleeve for pivotably receiving the ski spindle therein, and

a pair of radius rods mounted generally transverse to the longitudinal centerline of the chassis, each radius rod having an inner end pivotably attached to the chassis and an outer end pivotably attached to the front end of the trailing arm; and

an integral body panel enclosing and conforming to at least a portion of the chassis, the trailing arm being angled outwardly from the chassis' centerline such that the front end of the trailing and is spaced farther from the centerline than the rear end of the trailing arm such that the front end of the trailing arm is visible when viewed from the side, the rear end of the trailing arm being pivotably secured to the chassis adjacent to a lower side panel of the body panel, the rear end of the trailing arm being disposed between the lower side panel and the centerline of the chassis.

9. The snowmobile of claim **8** wherein the rear end of the trailing arm is pivotably secured to the chassis at a position such that, viewed from above, the trailing arm forms an angle of at least 8° with respect to the chassis centerline.

10. The snowmobile of claim **8**, wherein the rear end of the trailing arm is pivotably secured to the chassis at a position such that the trailing arm is oriented at an angle of at least 10° with respect to the chassis centerline.

11. The snowmobile of claim **8**, wherein at least a portion of the lower side panel covers an outside surface of the rear end of the trailing arm.

12. The snowmobile of claim **8**, wherein the rear end of the trailing arm is secured to the chassis at a position such that, viewed from the side, the rear end of the trailing arm is concealed by the lower body panel.

13. A snowmobile comprising a chassis having a longitudinal centerline, a pair of skis, each ski being secured to the chassis by one or more radius rods and a trailing arm having front and rear ends, an integral body panel enclosing and conforming to at least a portion of the chassis, the trailing arm being angled outwardly from the chassis' centerline such that the front end of the trailing arm is spaced farther from the centerline than the rear end of the trailing arm such that the front end of the trailing arm is visible when viewed from the side, the rear end of the trailing arm being pivotably secured to the chassis adjacent to a lower side panel of the body panel, the lower side panel enclosing and conforming to a portion of the chassis, the rear end of the

trailing arm being located inward of at least a portion of the lower side panel.

14. The snowmobile of claim 13 wherein the rear end of the trailing arm is pivotably secured to the chassis at a position such that, viewed from above, the trailing arm forms an angle of at least 8° with respect to the chassis centerline.

15. The snowmobile of claim 13 wherein the rear end of the trailing arm is pivotably secured to the chassis at a position such that the trailing arm is oriented at an angle of at least 10° with respect to the chassis centerline.

16. The snowmobile of claim 13, wherein the rear end of the trailing arm is secured to the chassis at a position such that, viewed from the side, the rear end of the trailing arm is covered by the lower side panel.

17. The snowmobile of claim 13, wherein the rear end of the trailing arm is secured to the chassis at a position such that, viewed from the side, the rear end of the trailing arm is concealed by the lower body panel.

* * * * *

IMPROVED VEHICLE

Field of the Invention

This invention relates to recreational vehicles and more particularly to a snowmobile which is easily convertible to an all terrain vehicle which again can be convertible back to a snowmobile.

Background

Amateurs of recreational vehicles spend time on their vehicles in both winter and summer. In winter a snowmobile having a track and pair of skis is generally used and in the summer the same enthusiasts switch to an all terrain vehicle which is capable of going over rough terrain in forests and the like. In recent years the cost of snowmobiles and all terrain vehicles has risen dramatically as such vehicles improve in terms of style, power and reliability. Furthermore, the vehicles themselves are larger. Storage space being a factor, many enthusiasts are not only unable to afford two vehicles but simply do not have the space to store one of the vehicles in the off season. With these things in mind, the present inventors sought to produce an improved vehicle which was manoeuvrable on both snow and bare land through a simple conversion.

Unfortunately, a typical snowmobile unibody frame or chassis is not strong enough to withstand the rough use which an all terrain vehicle must endure. Furthermore, an all terrain vehicle chassis or frame does not have the tunnel formation necessary to convert it to a snowmobile. In addition, the positions of the engine and driver in a typical snowmobile is forwardly and rearwardly respectively.

However, in an all terrain vehicle the driver's center of gravity must be between the front and rear axles otherwise poor handling and poor manoeuvrability occurs.

SUMMARY OF THE INVENTION

The inventors of the present invention thereby set out to construct a vehicle which incorporated a frame, a seat position, and a front and rear suspension suitable for both a snowmobile and an all terrain vehicle.

Unanticipated by the inventors, their snowmobile which is shortened so that the rider sits forwardly and the engine is moved rearwardly turned out to have high manoeuvrability and was just as stable or more so than the prior art type snowmobiles. Therefore, this invention seeks to provide an improved recreational vehicle adapted for use on snow or bare ground; said vehicle being shorter in length than a prior art snowmobile; said vehicle being constructed such that an operator is positioned forwardly, and an engine is placed rearwardly such that in operation, said engine and said operator are located close to the midpoint of the vehicle. This invention further seeks to provide a vehicle including a unibody rear chassis and an upper support structure, said rear chassis including a tunnel adapted to permit a chain drive or track move therethrough; said upper support structure including a plurality of frame members thereby providing additional strength to the vehicle for all terrain use.

Another embodiment of the invention is a new stabilizer bar arrangement on the front suspension whereby the stabilizer bar runs through, on each end, a plastic block or stabilizer block. The block not only pivots but moves

inwardly and outwardly such that if one ski rises the other will rise also.

The present invention uses a new unitary front sub-frame assembly which is attached to the main frame and which basically houses the front suspension components. The rear of the main frame is the standard unibody frame with a tunnel therein which permits the mounting of either a chain drive or track.

The sub-frame and rear unibody tunnel-type frame are connected together with various stabilizer bars and lateral supports to produce a very solid frame capable of the abuse of all terrain driving.

Because the snowmobile body is shortened considerably, a snow flap is necessary to cover the rear part of the track. This snow flap is capable of substantial movement depending upon the compressed or extended state of the rear suspension.

The vehicle also uses a new type of cradle arrangement as an engine mount. The engine can be affixed to the engine mount out of the vehicle and then during assembly the entire engine and engine mount are manoeuvred into the frame and secured thereto.

The vehicle also has another feature. When using the vehicle as an all terrain vehicle only one seat is provided and the portion of the body behind the seat normally present during snowmobile use is removed and a mud guard-type fender installed in its place. Also capable of being installed in the place of the rear portion of the snowmobile body is a second seat which permits the addition of another rider.

The improved vehicle also has a track and rear suspension with more vertical play. This allows for the required vertical compression and extension for an all terrain vehicle rear suspension.

Another improvement is the addition of a chain drive to act as a braking system for the all terrain vehicle, since normally in a snowmobile the braking system is arranged on the track.

Brief Description of the Drawings

The invention will be more fully described in conjunction with the following drawings wherein:

Fig. 1 is a schematic side view of a driver operating a prior art snowmobile in a normal seated position;

Fig. 2 is a schematic side view of a driver operating a prior art snowmobile in a forward leaning racing position;

Fig. 3 is a schematic side view of a driver operating a prior art all terrain vehicle in a normal seated position;

Fig. 4 is a schematic side view of a driver operating a motorcycle in a normal seated position;

Fig. 5 is a schematic side view of a driver operating a snowmobile of the present invention in a normal seated position.

Fig. 6 is a schematic side view comparing a driver's position on a prior art all terrain vehicle and a driver's position on a snowmobile of the present invention;

Fig. 7 is a schematic side view comparing a driver's position on a prior art motorcycle and a driver's position on a snowmobile of the present invention;

Fig. 8 is a schematic side view comparing a driver's position on a prior art Harley Davidson Cruiser with a driver's position on the snowmobile of the present invention.

Fig. 9 is a schematic side view comparing a driver's position on a prior art snowmobile and a driver's position on the snowmobile of the present invention;

Fig. 10 is a schematic side view of a driver sitting on a snowmobile of the present invention;

Fig. 11 is a perspective view of the unibody frame of the present invention;

Fig. 12 is another perspective view of the unibody frame of the present invention;

Fig. 13 is a perspective view of the unibody frame of the present invention with additional structural supports;

Fig. 14 is a perspective view of ski leg of the present invention;

Fig. 15 is various views of a lower front support arm;

Fig. 16 is a partial view of the frame of the present invention and part of the left front suspension;

Fig. 17 is a perspective view of parts of the front suspension;

Fig. 18 is a perspective view of the sub-frame of the front

suspension;

Fig. 19 is a perspective view of the front suspension of the present invention;

Fig. 20 is a perspective side view of partially completed vehicle of the present invention;

Fig. 21 is a perspective front view of a partially completed vehicle of the present invention;

Fig. 22 is a front view of a partially completed vehicle of the present invention;

Fig. 23a is a schematic side view of the basic components of the rear suspension of the present invention in a compressed state;

Fig. 23b is a schematic side view of the basic components of the rear suspension of the present invention in a relaxed or extended state;

Fig. 24a is a schematic side view of the rear suspension (in a compressed state) for use when it is equipped with wheels;

Fig. 24b is a schematic side view of the rear suspension (in an extended state) for use when it is equipped with wheels;

Fig. 25a is a schematic side view of the basic components of the rear suspension in a compressed state for use when it is equipped with a track;

Fig. 25b is a schematic side view of the basic components of the rear suspension in an extended state for use when it is equipped with a track;

Fig. 26a is a schematic side view of the components of the rear suspension in a compressed state when it is equipped with a track rail;

Fig. 26b is a schematic side view of the components of the rear suspension in an extended state when it is equipped with a track rail;

Fig. 27 is a schematic side view showing rear suspension movement between an extended state and a compressed state;

Fig. 28 shows a rear passenger seat and a rear end body portion in perspective view; and

Fig. 29, 30, 31, and 32 are various copies of photographs of the all terrain vehicle and snowmobile of the present invention.

Detailed Description of the Invention

In Fig. 1, one notes a man sitting to the rear of the seat in the dark outline shown as (A). He is seated on a prior art know snowmobile. One notices the weight of the rider is over the rear section of the track. The motor (not shown) is located over the skis.

In Fig. 2, the operator is leaning forward in a racing position as shown in outline (B). Thus, the weight of the driver is slightly forward which is more useful in doing tight turns and other manoeuvres.

In Fig. 3, a driver is shown on a prior art all terrain vehicle (2). His body position is in outline marked (C). The driver is considerably further ahead on the vehicle than prior art snowmobiles. Thus, his center of gravity is closer to the midpoint between the wheels.

In Fig. 4, a driver is shown in outline (D) sitting on a standard motorcycle marked (3). The driver is even further forward with regard to the

center of gravity of the vehicle.

In Fig. 5, a driver is shown in outline (E) as seated upon the snowmobile of the present invention shown as (4). The driver is seated considerably ahead of a driver's position on a normal snowmobile and closer to the midpoint of the vehicle.

In Fig. 6 the outline of the snowmobile of the present invention is in dotted lines and shown as (4). This is compared to a standard all terrain vehicle (2) which is shown in solid lines. The driver's position (E) on the snowmobile of the present invention and (C) on an all terrain vehicle of the prior art type are almost identical. Thus, in the snowmobile of the present invention, the driver is seated approximately in the same position as on a normal all terrain vehicle.

In Fig. 7, a standard prior art motorcycle is shown in solid lines (3) and the driver position as marked as (D). The snowmobile of the present invention is in dotted lines marked as (4) and the driver's position is (E). Thus, the driver's position is somewhat rearwardly of a normal driver's position on a motorcycle.

Fig. 8 shows a driver in a position (A) in dotted lines on a prior art snowmobile (1) outlined in dotted lines. This is compared to a driver's position (F) on a prior art stretch motorcycle (5).

Fig. 9 compares a prior art snowmobile in solid lines marked as 1 with a snowmobile of the present invention in dotted lines marked (4). The driver (A), in solid lines, is sitting on the prior art snowmobile (1) and the driver (E) in dotted lines seated on the snowmobile of the present invention (4). One notes a

significant difference in the positions of the two drivers. Driver (E) is much further ahead and closer to the center of the vehicle. In addition, the new vehicle (4) is considerably shorter in length than the old snowmobile (1).

The present invention is shown in greater detail with its component parts commencing with Fig. 10. In Fig. 10, there is a unibody frame (10). The driver is on a seat (11) and is holding on the handle bars (13) of the steering column (12).

In Fig. 10, there is a shock absorber (14) of the front suspension. The ski leg (15) which is used for not only supporting the ski assembly (16) but also wheels (not shown in Fig. 10) is also shown. The engine (17) is placed on a cradle-type engine mount shown as (18). This is done during production. It is then with the use of pins or brackets or screws (21) affixed to the frame.

There are a pair of drive shafts (19) and (20). An endless belt or track (9) is held in place and revolves about the track rail (22). The track rail (22) is suspended using linkage (24) and a shock absorber (23). The track (9) circles around the rear idler wheel (25). The rear track cover (26) is pivotable up and down depending upon whether the rear suspension is in a compressed or extended state.

In Fig. 11 and 12 are perspective views of the unibody chassis or frame (10). A tunnel area (27) is shown with a curved arrow and indicates the area where the track (9) or chain (52) of the present invention travels.

In Fig. 13 some structural components have been added to the frame in the form of lateral side braces (28a and 28b). There is also a right front frame

member (30a) and a left front frame member (30b). Cross braces (29 and 33) strengthen the frame. A horizontal flange (32b) is shown which forms the basis of the foot well. A left lateral flange (31b) has also been attached. This upper metallic structure increases the torsional rigidity and the resistance to flex of the unibody.

In Fig.14 unitary cast ski leg (15) is used to provide attachment for wheels when the vehicle is used as an all terrain vehicle and skis when used as a snowmobile.

Fig. 15 shows various views of the lower front suspension support arms (34). There is in fact a lower left front suspension support arm (34b) and a lower right front suspension support arm (34a). Support arm anchors (35) are also shown.

In Fig. 16, further structural components are shown. There is a left front strut (36b) and a right front strut (36a) which connect to the frame at cross brace (29). These struts attach to front suspension cross brace (37) at either end. Each end of cross brace (37) is attached to a shock absorber (14).

The basic components of the front suspension are shown clearly in Fig. 17. There is a lower left suspension support arm (34b), a lower right suspension support arm (34a), an upper right suspension support arm (38a) and an upper left suspension support arm (38b). Bushings (41) are seen. A stabilizer bar (39) has been added and is adapted to slide and pivot by way of pivot blocks (40a and 40b). These blocks slide about the lower suspension arms (34a and 34b).

In Fig. 18 one views the front sub-assembly frame (42).

Fig. 19 shows the front suspension in a near complete condition. The sub-frame (42) connects together the various support arms and also supports a steering gear box (44) which connects to a steering rod (43). The steering gears (44) are adapted to move by steering column (12).

Fig. 20 shows the front suspension in a near completed condition with the exception of the steering rod (43) which has not yet been connected. A crank shaft (45) is visible through an aperture in the side of the unibody frame (10).

Fig. 21 shows the chassis and suspension basically completed. Most of the suspension force is transferred by way of a pyramidal structure to a common point, i.e. at cross-bar (27).

The pyramidal structure of transmitted force from the suspension is more evident in Fig. 22. Again in Fig. 22 one sees the stabilizer bar sliding blocks (40a and 40b) which hold the ends of the stabilizer bar (39). The stabilizer bar sliding blocks move along lower suspension support arms (34b and 34a).

In Figs. 23A and 23B, the rear suspension, adapted for an all terrain vehicle is shown. In Fig. 23A the suspension is shown in the compressed position and in Fig. 23B it is in the extended position. There is a rear suspension support arm (46) attached to a rear axle (47). There is a first linkage (48), a second linkage (49) and a third rear suspension linkage (50). These are adapted to attach to a shock absorber (23). A front linkage (56) is also shown.

Figs. 24A and 24B show the rear suspension linkage adapted to a

chain drive. There is a driving sprocket (51), a chain (52), an upper idler sprocket (53) and a lower idler sprocket (54). The chain attaches around a driven sprocket (55) which connects to the rear axle for movement. In Fig. 24A the suspension is in the compressed position and in Fig. 24B it is in the extended position.

In Figs. 25A and 25B a similar type of rear suspension is shown. However, the linkage is somewhat different as it is equipped for use with a snowmobile having a track at the rear-end rather than wheels. Again, there is a support arm (46), the first linkage (48), the second linkage (49 and 50), and the front linkage (56). The shock absorber (23) is also present. One notes however, that the linkage (48) is attached at a different position on the lower part of the axle. This is necessary for the snowmobile track function. Again, Fig. 25A is a suspension in the compressed state and in Fig. 25B it is in the extended state.

In Figs. 26A and 26B, the suspension is adapted for a snowmobile. Again there are the three linkages (48, 49 and 50), the front linkage (56), and the shock absorber (23). There is also the rear idler wheel (25) as well as idler wheels (57, 58 and 59).

One notes that the idler wheels in Figs. 26a and 26b ride about the track rail (22). The rear idler wheel (25) is attached to rear idler lift arm (60) which is pivotally mounted to the unibody frame.

In Fig. 27, one views the rear snowmobile suspension in two positions, the extended and the compressed positions. One notes the rear idler lift arm (60) is attached to the snow cover or snow flap (26).

In Fig. 28, there is shown a removable rear body portion (61) which

is attached behind the driver's seat. This removable rear body portion is removed and replaced by a mud guard fender assembly (not shown) when the vehicle is used as an all terrain vehicle. In the event that a second seat is required for a passenger during snowmobile operation, seat (62) is placed in the same position as the removable rear body portion (61). Seat (62) has a foot rest (63) and a seat back (64).

In Figs. 29, 30, 31 and 32 the improved vehicle of the present invention is shown in photographs at various stages of completion. As seen in Fig. 30 and particularly TP01, the snowmobile and the all terrain vehicle are shown with an identical frame and chassis. The all terrain vehicle appears shorter simply because the rear seat has been removed. In Fig. 32 photograph TP5, one notes the mud guard has replaced the end portion of the snowmobile body.

THE EMBODIMENTS OF THE INVENTION FOR WHICH AN EXCLUSIVE PROPERTY OF PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An improved recreational vehicle adapted for use on snow or bare ground; said vehicle being shorter in length than a prior art snowmobile; said vehicle being constructed such that an operator is positioned forwardly, and an engine is placed rearwardly such that in operation, said engine and said operator are located close to the midpoint of the vehicle.

2. A vehicle as claimed in claim 1 including a unibody rear chassis and an upper support structure, said rear chassis including a tunnel adapted to permit a chain drive or track move therethrough; said upper support structure including a plurality of frame members thereby providing additional strength to the vehicle for all terrain use.

3. A vehicle as claimed in claim 2 including a front suspension; said front suspension adapted for use with a pair of skis or a pair of wheels, said front suspension including a pair of ski legs adapted to be connected to said wheels or said skis.

4. A vehicle as claimed in claim 2 including a rear suspension; said rear suspension comprising a support arm, a plurality of linkages, and at least one (1) shock absorber; said suspension being adapted for use with a snowmobile track,

or a chain drive and a pair of wheels.

5. A vehicle as claimed in claim 2 including a removable rear end body portion; said rear end body portion being in operation removed for all terrain vehicle use and replaceable by a fender/mud guard assembly; said end body portion also replaceable with a rear seat assembly, when said vehicle is used as a snowmobile.

6. A vehicle as claimed in claim 1 including a removable engine mount cradle, said cradle adapted to be connected to said engine during assembly line operation and thereafter placed into said vehicle and fixedly attached thereto.

7. A vehicle as claimed in claim 1 further including a pivotal snow track guard cover; said cover being mounted to said vehicle when said vehicle is equipped with a snowmobile track.

ABSTRACT

A new improved recreational vehicle is provided. The vehicle is adapted for use as a snowmobile or an all-terrain vehicle. A typical unibody tunnel type snowmobile chassis is reinforced by pyramidal upper support frame members to withstand the rigors of all-terrain use. Furthermore, the vehicle is shorter than a typical snowmobile in order to position the driver and engine closer to the midpoint of the vehicle, which is necessary for all terrain vehicle manoeuvrability and control. The rear suspension has a unique system of linkages which make it suitable for chain drive and wheels or a snowmobile track and track rail.

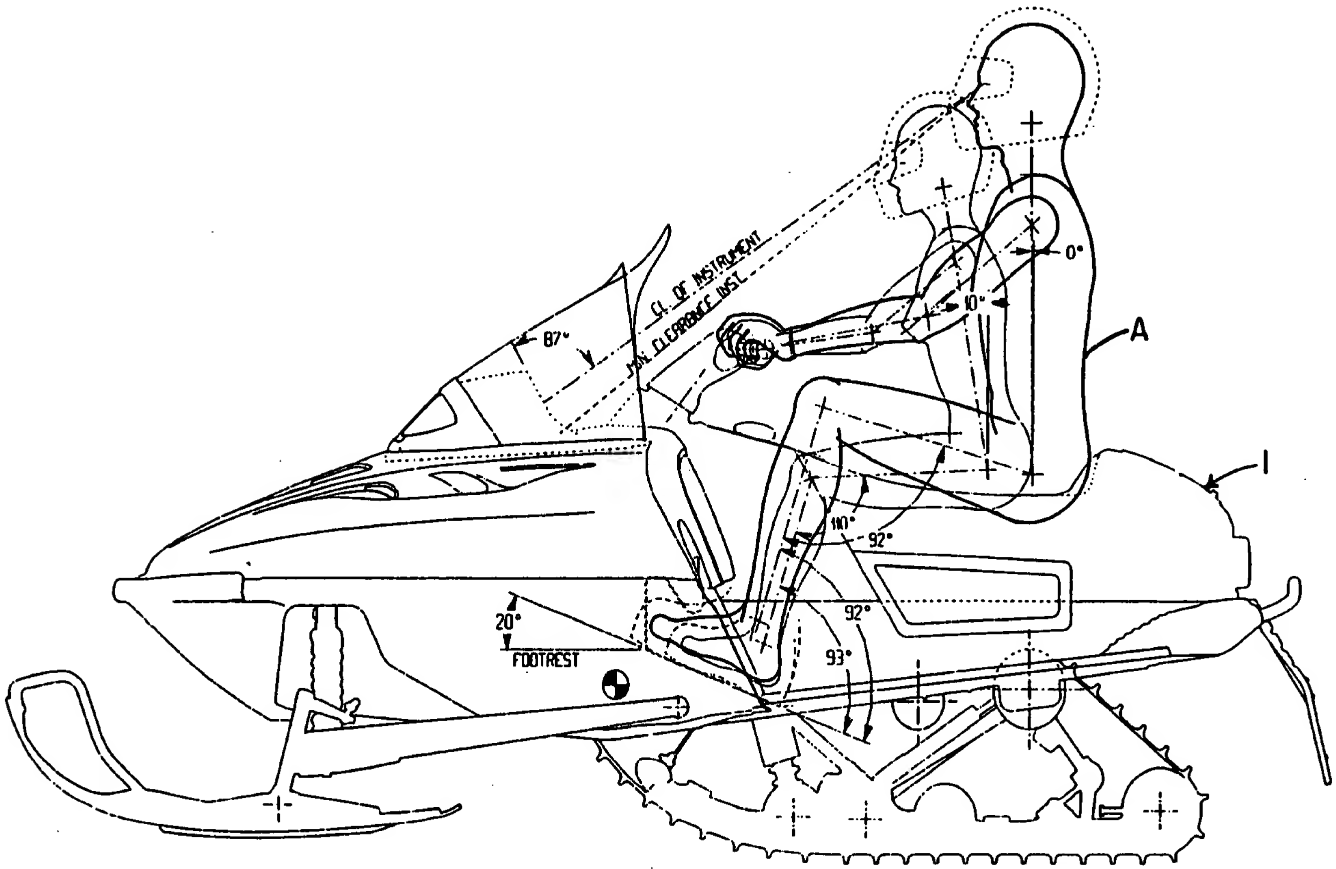


FIG. 1

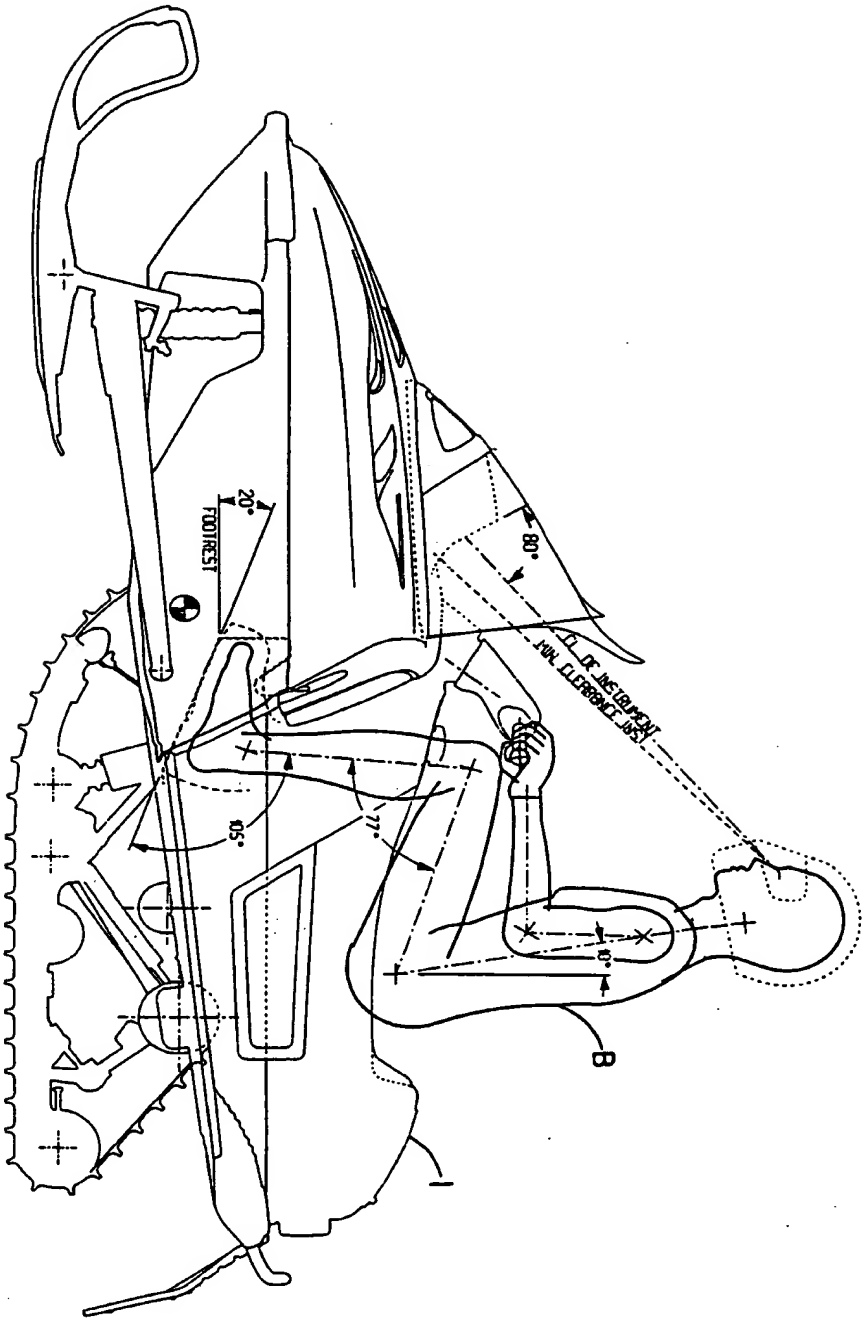


FIG. 2

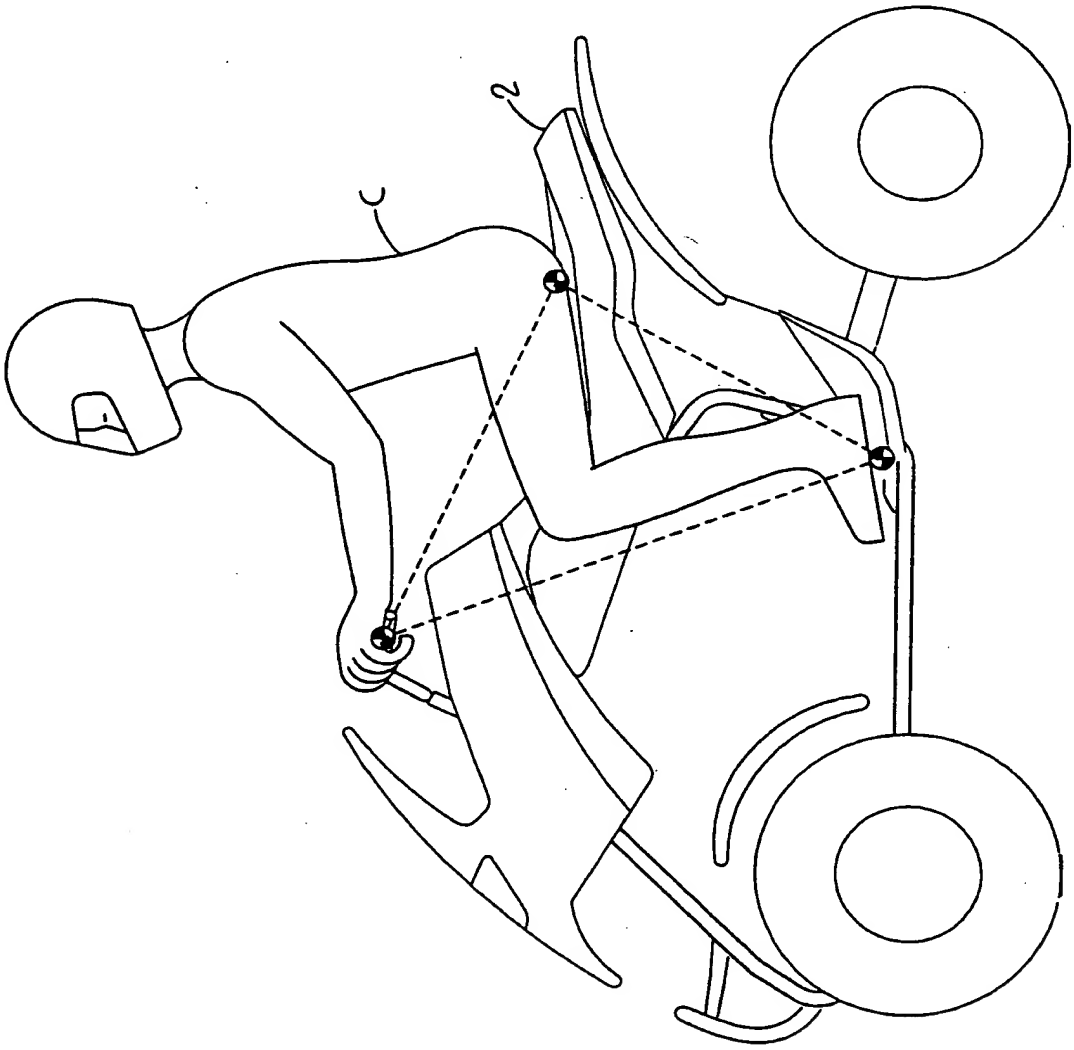


FIG. 3

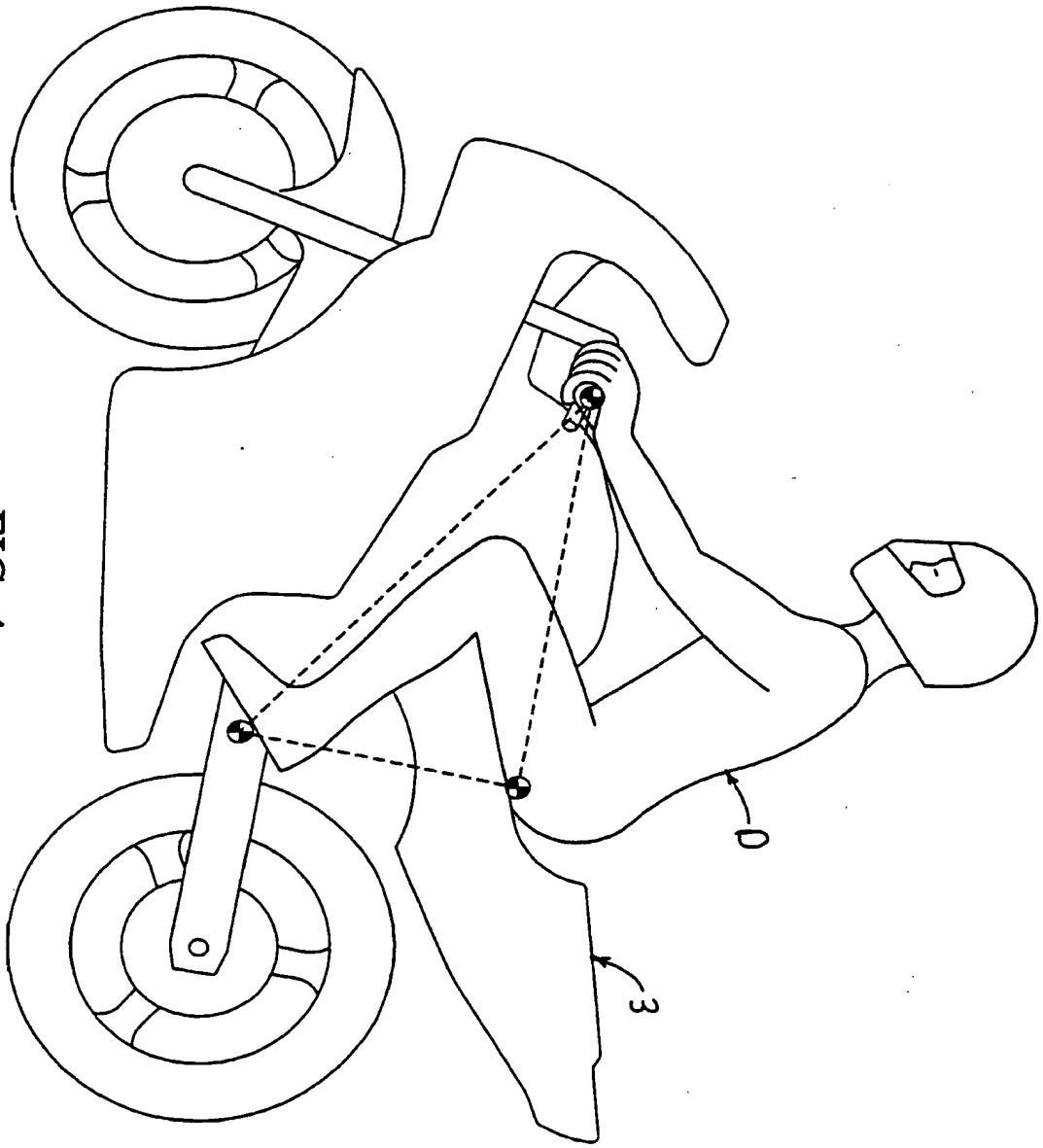


FIG. 4

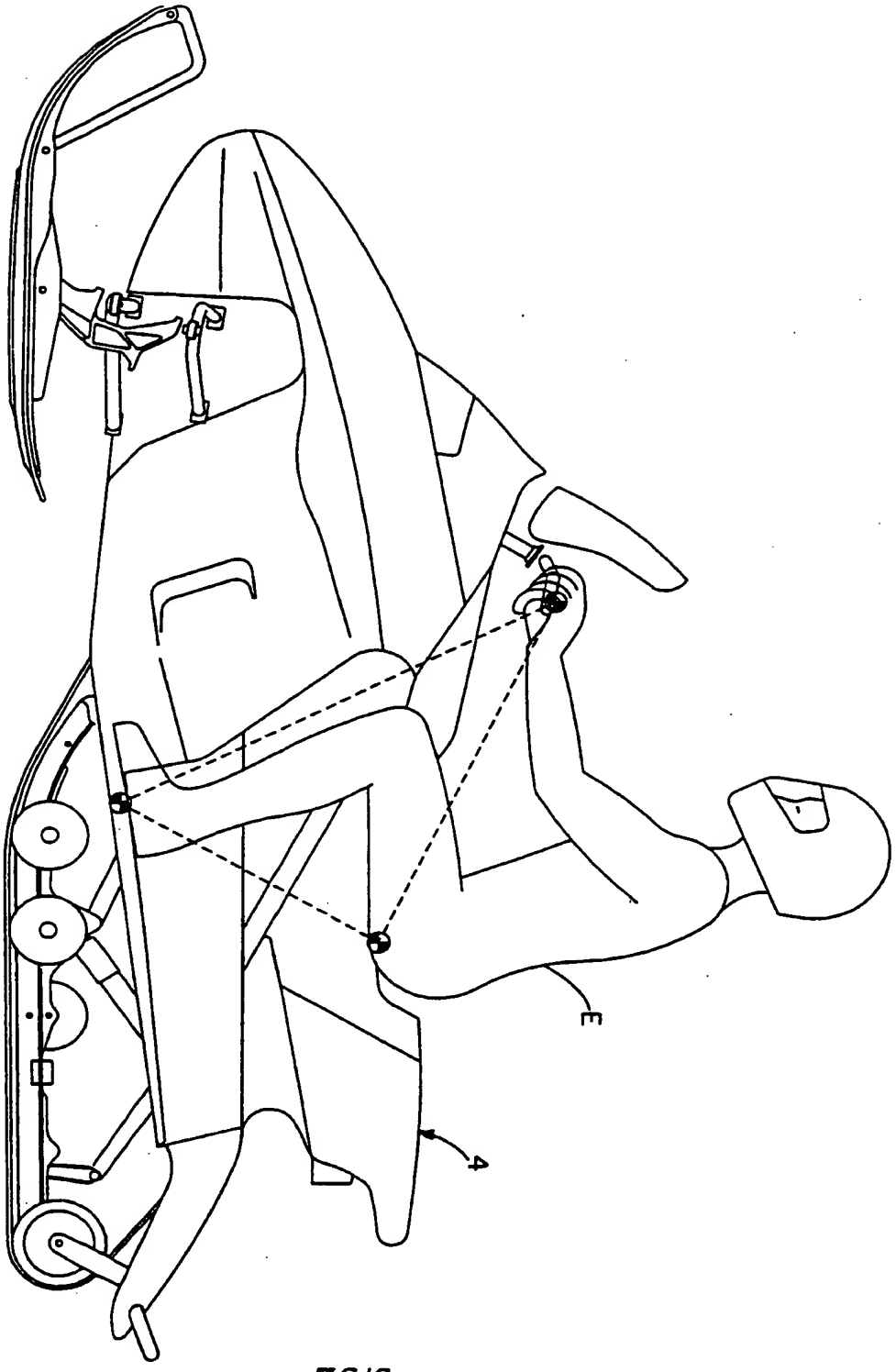


FIG. 5

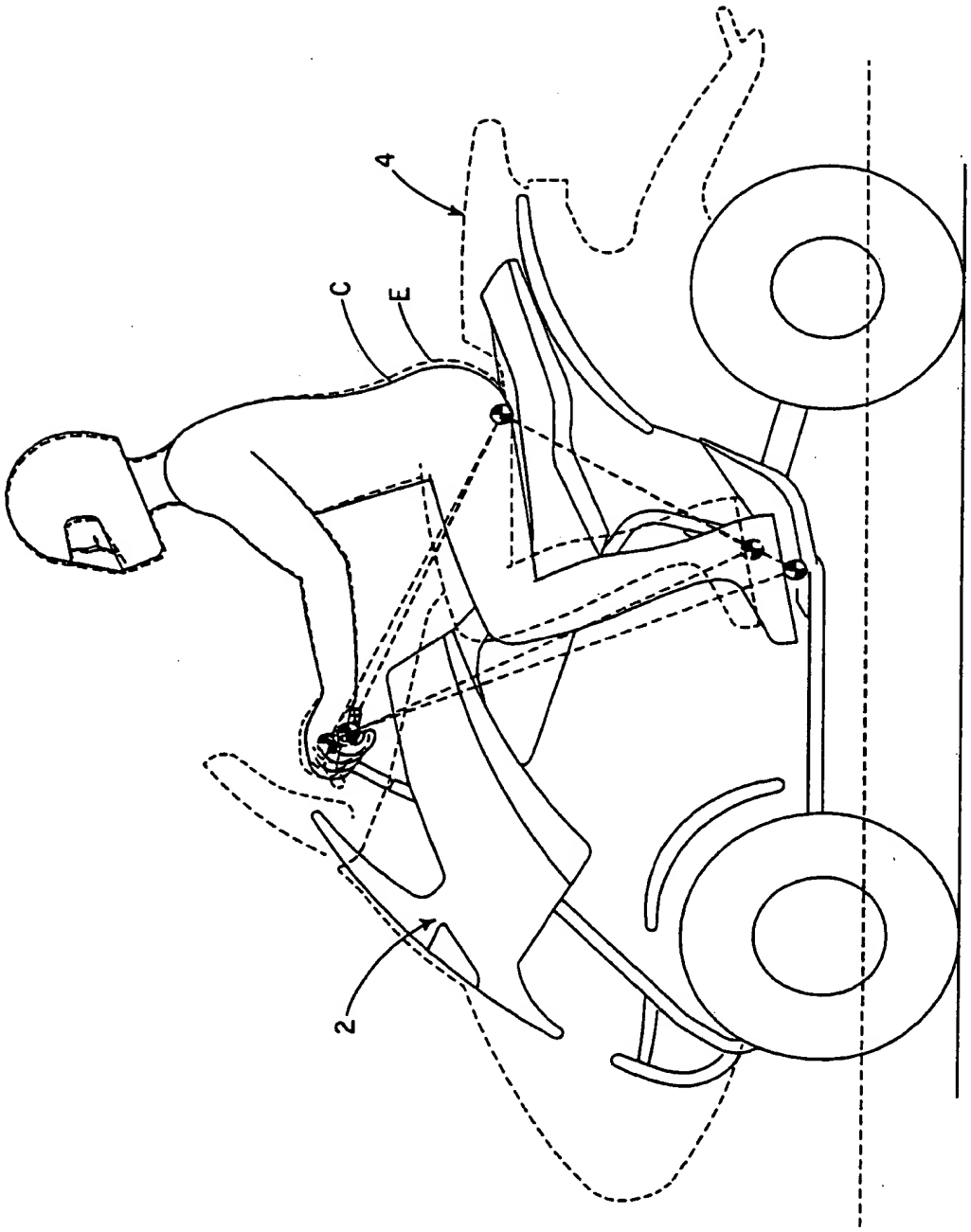


FIG. 6

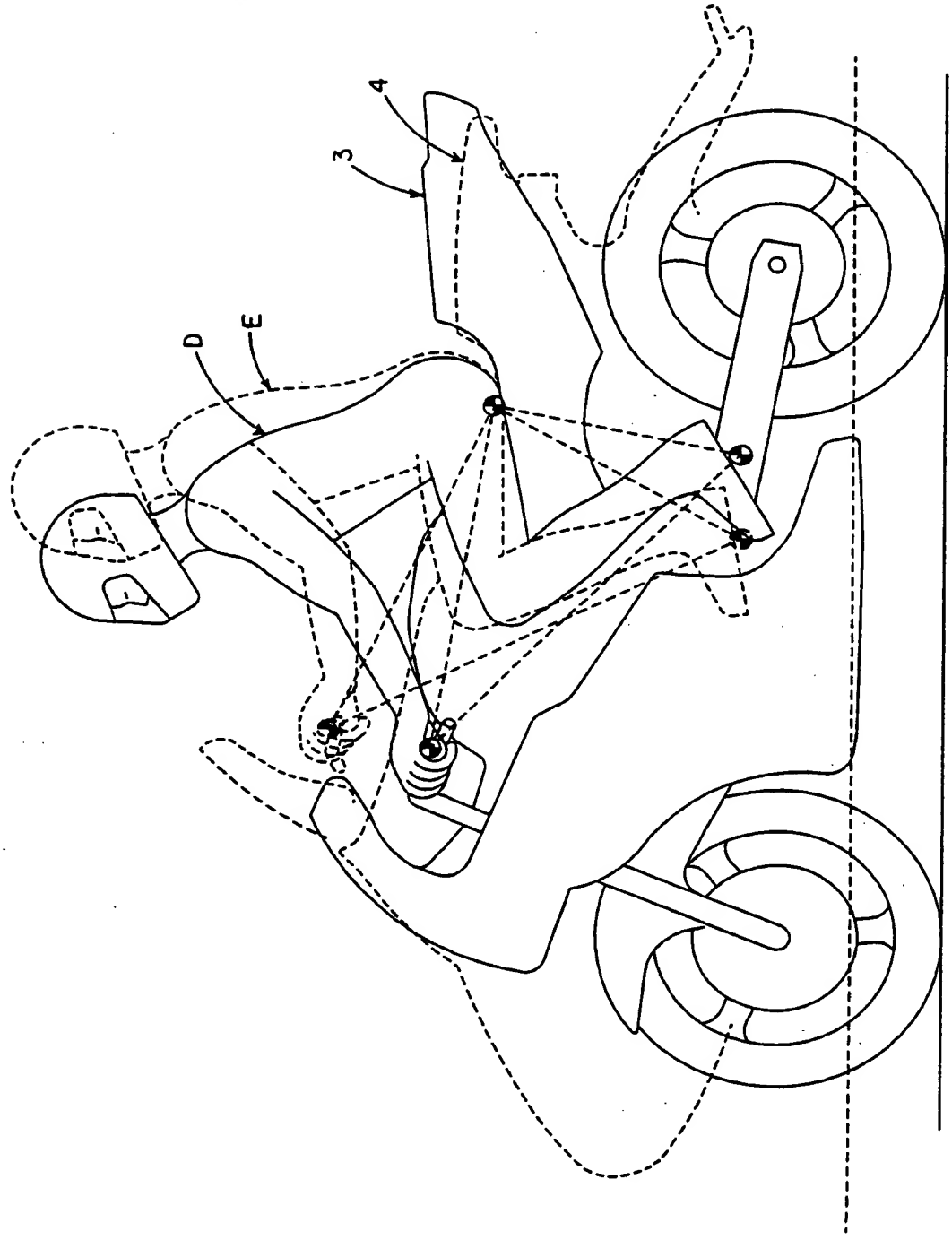


FIG. 7

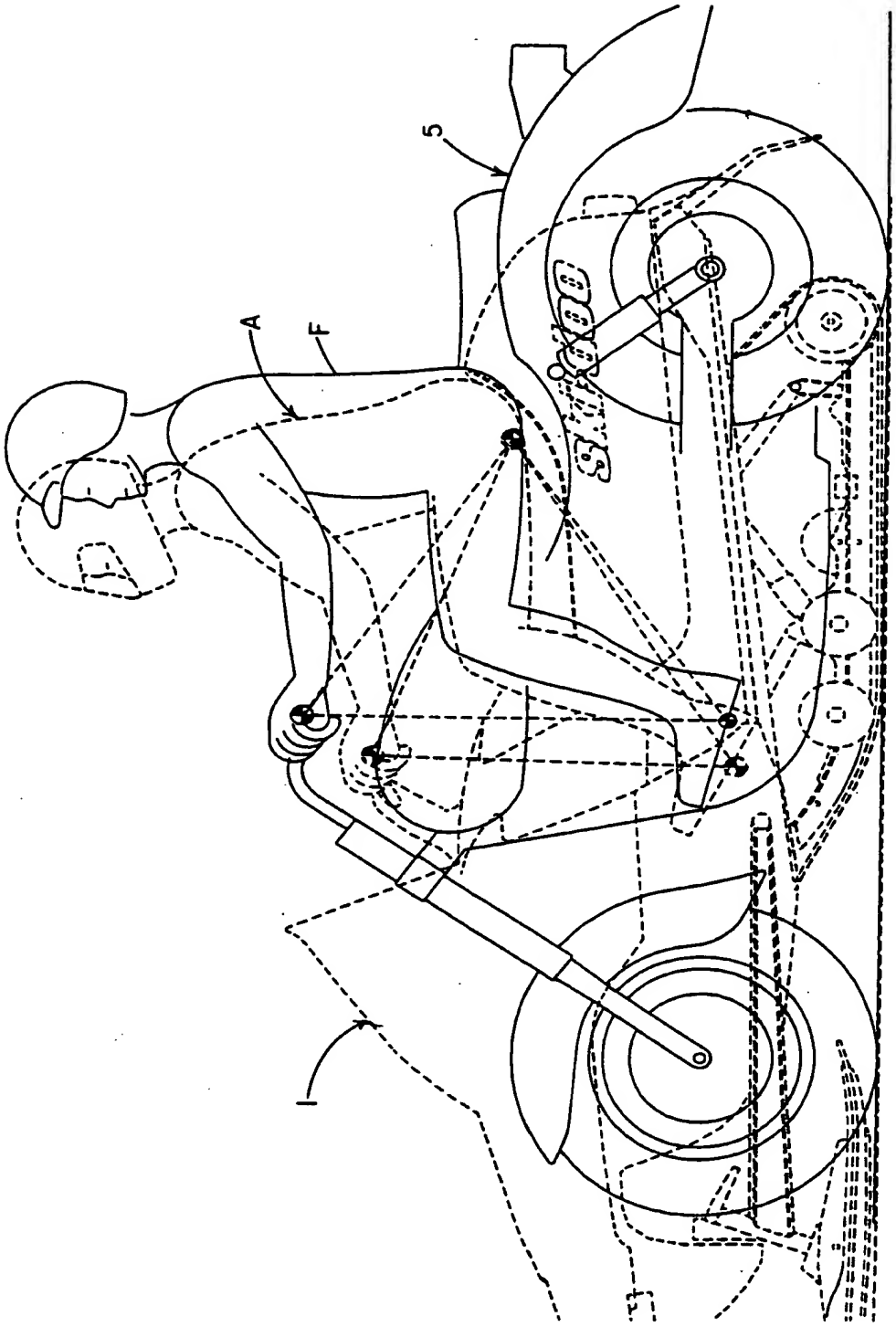


FIG. 8

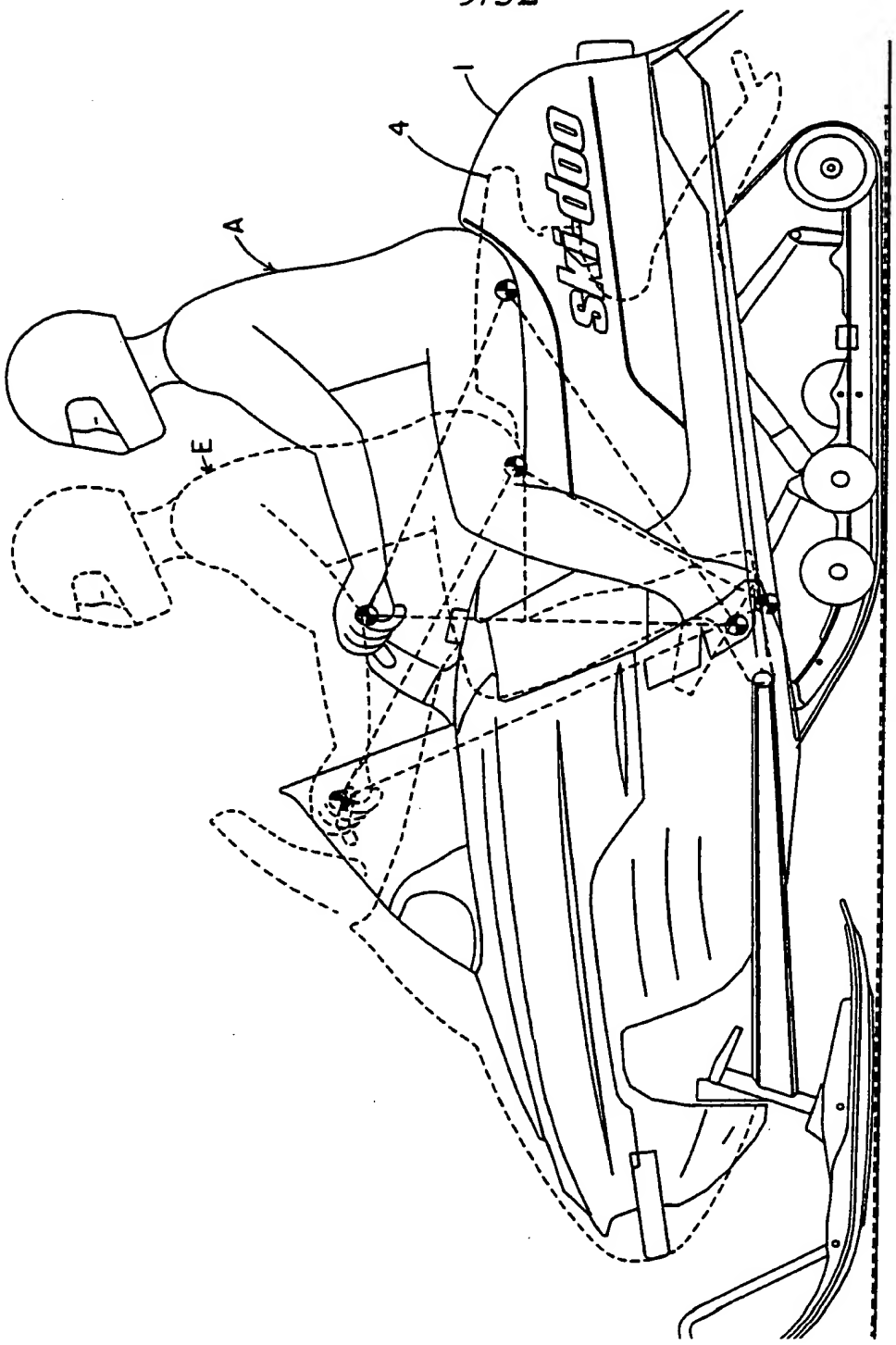


FIG. 9

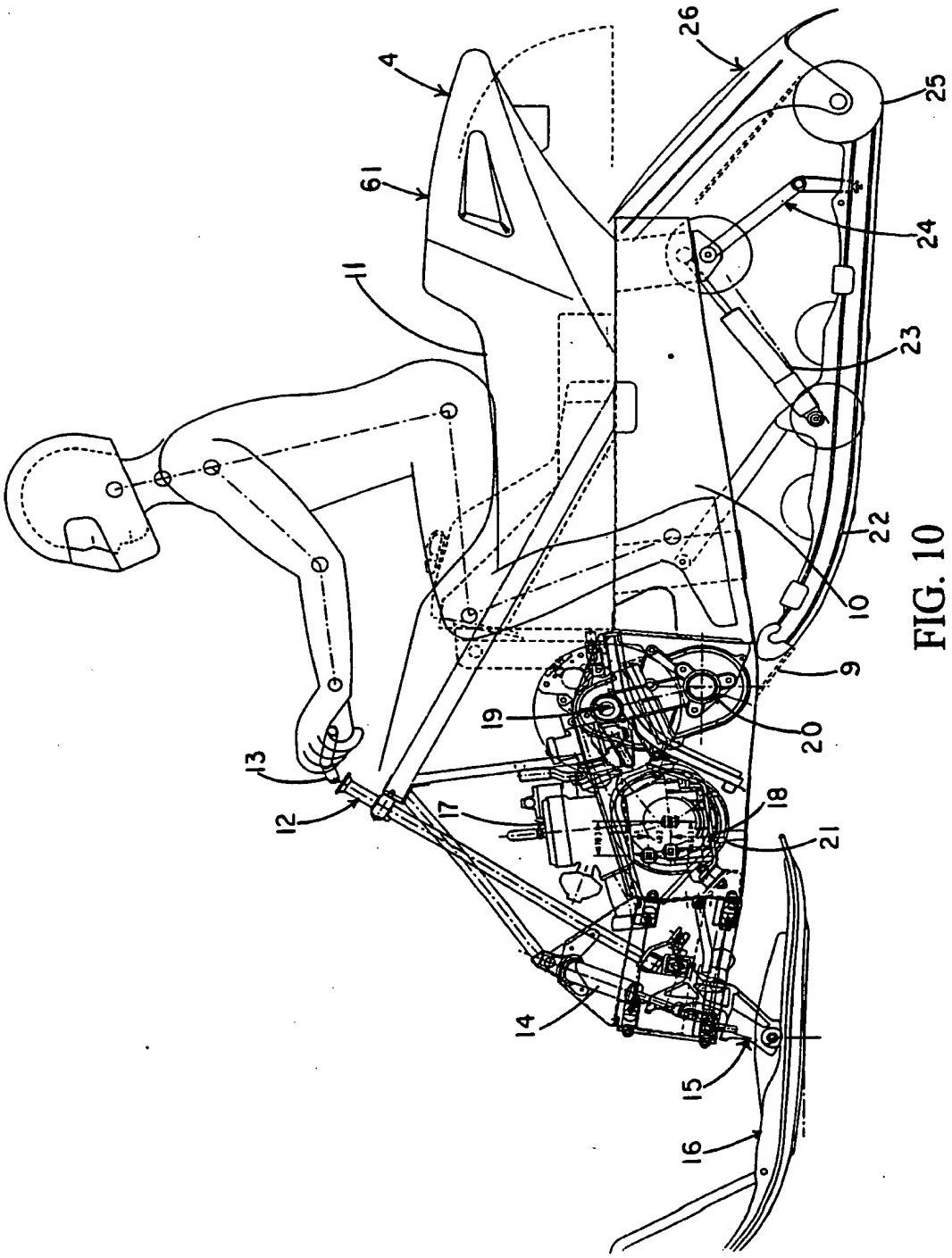


FIG. 10

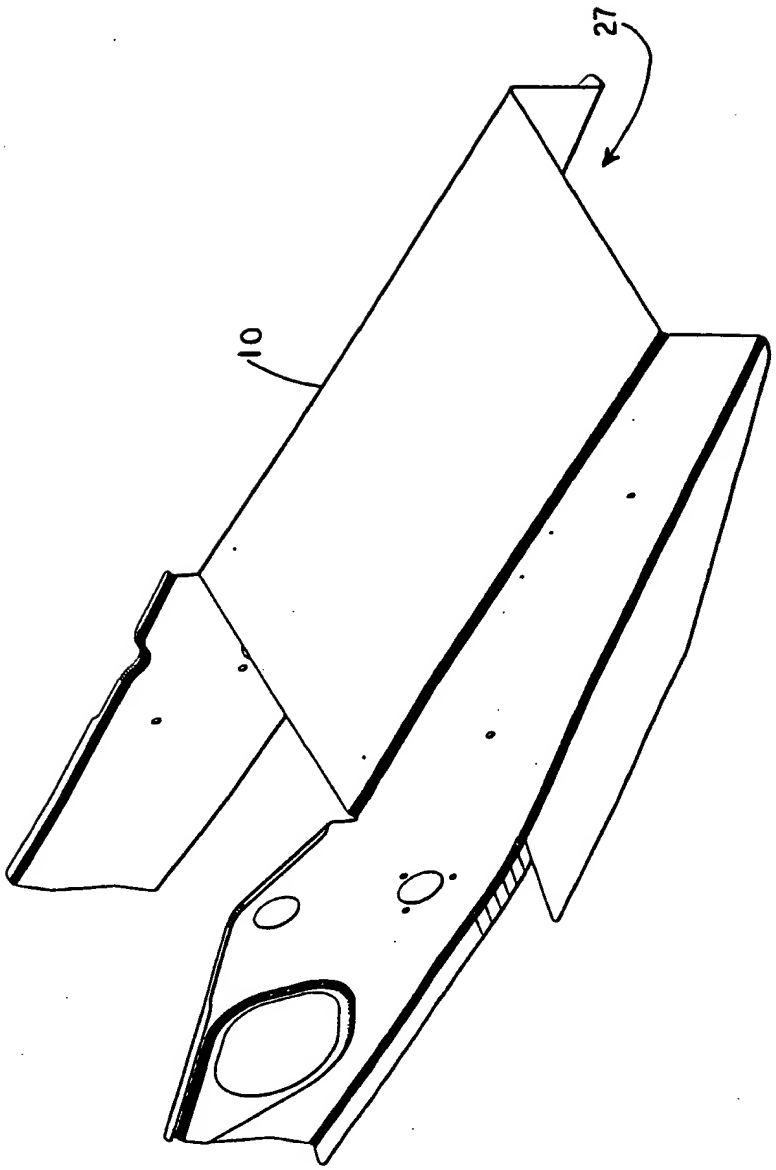


FIG. 11

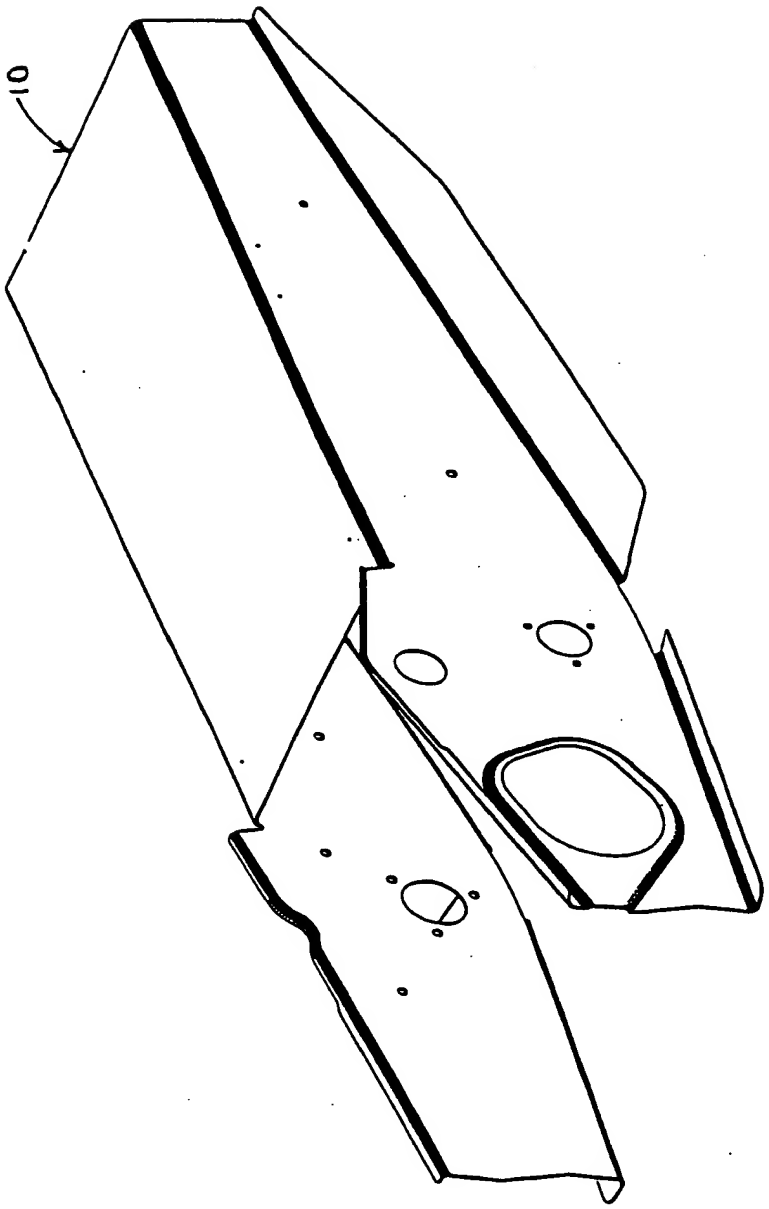


FIG. 12

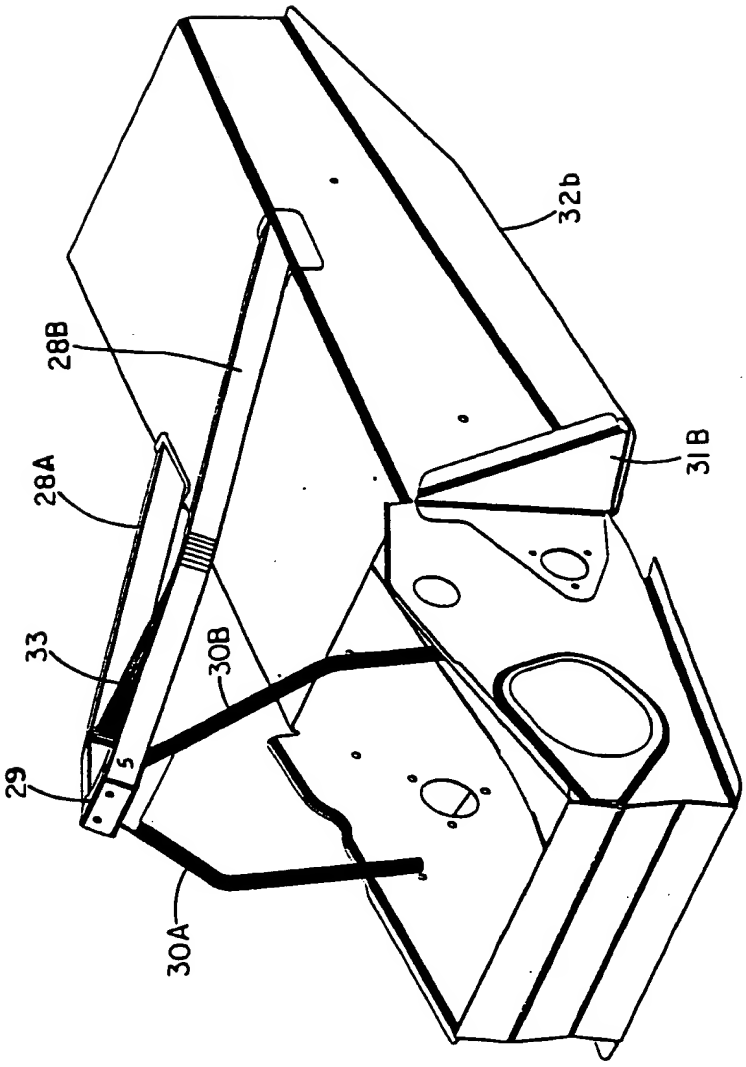


FIG. 13

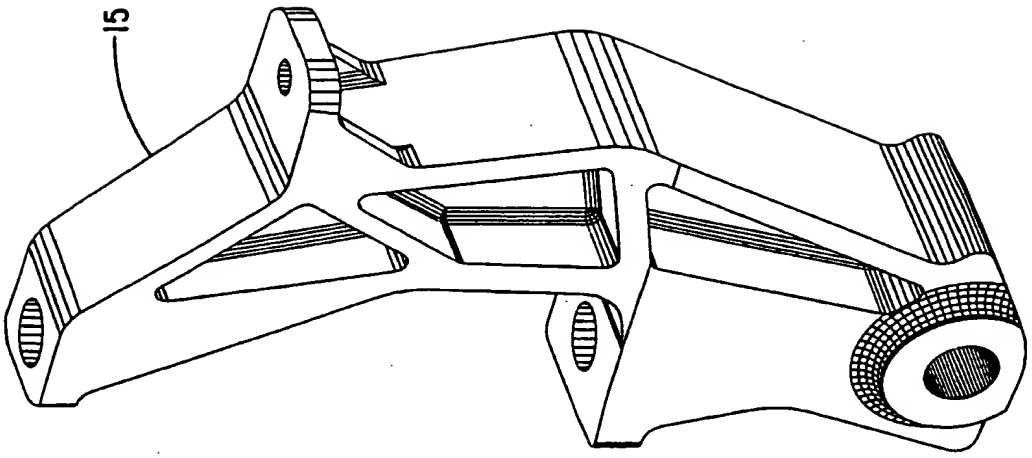


FIG. 14

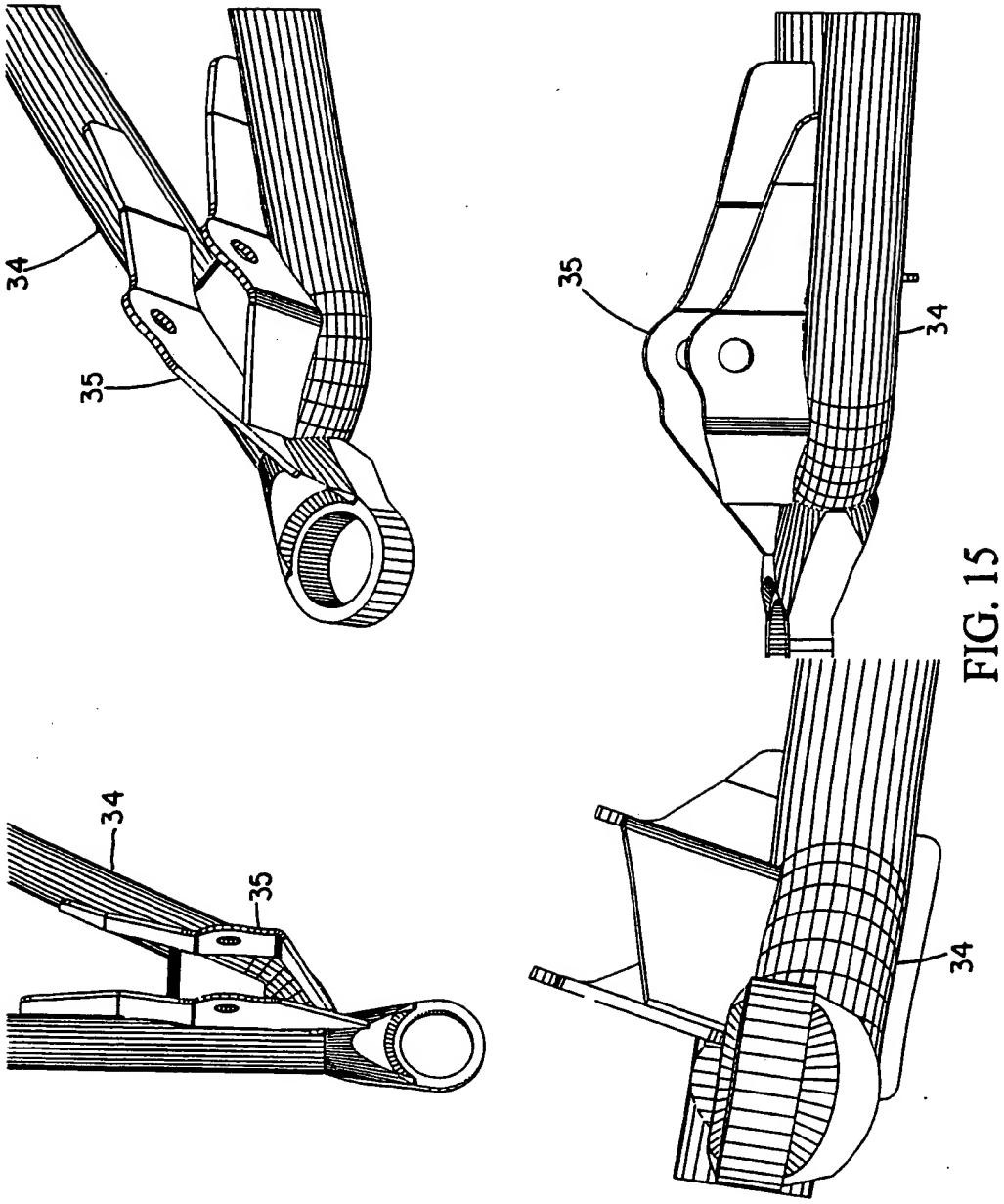


FIG. 15

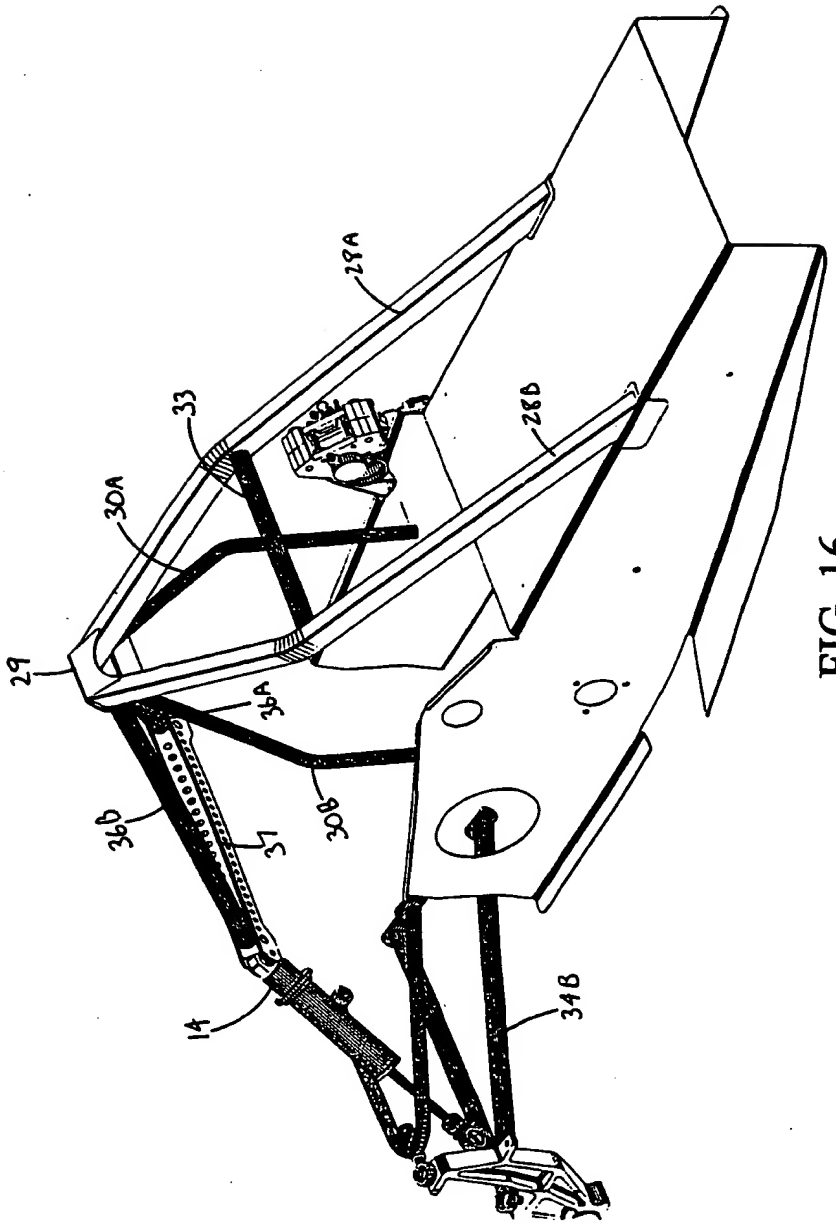


FIG. 16

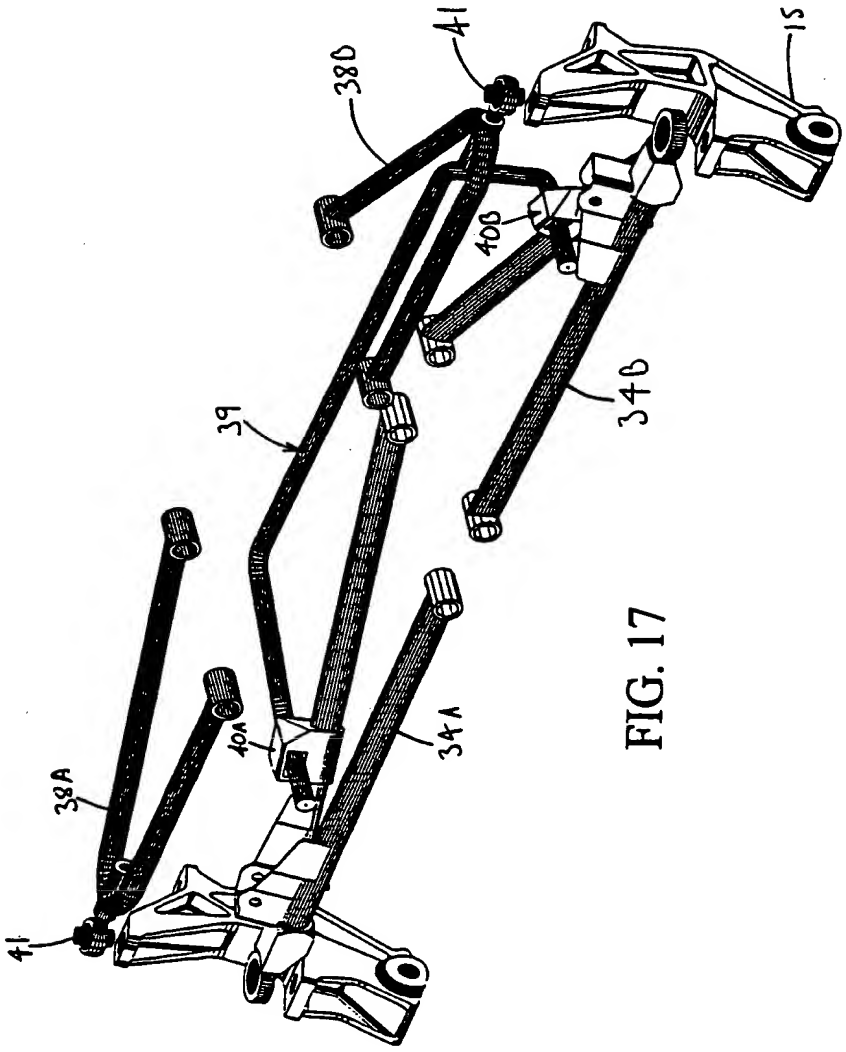


FIG. 17

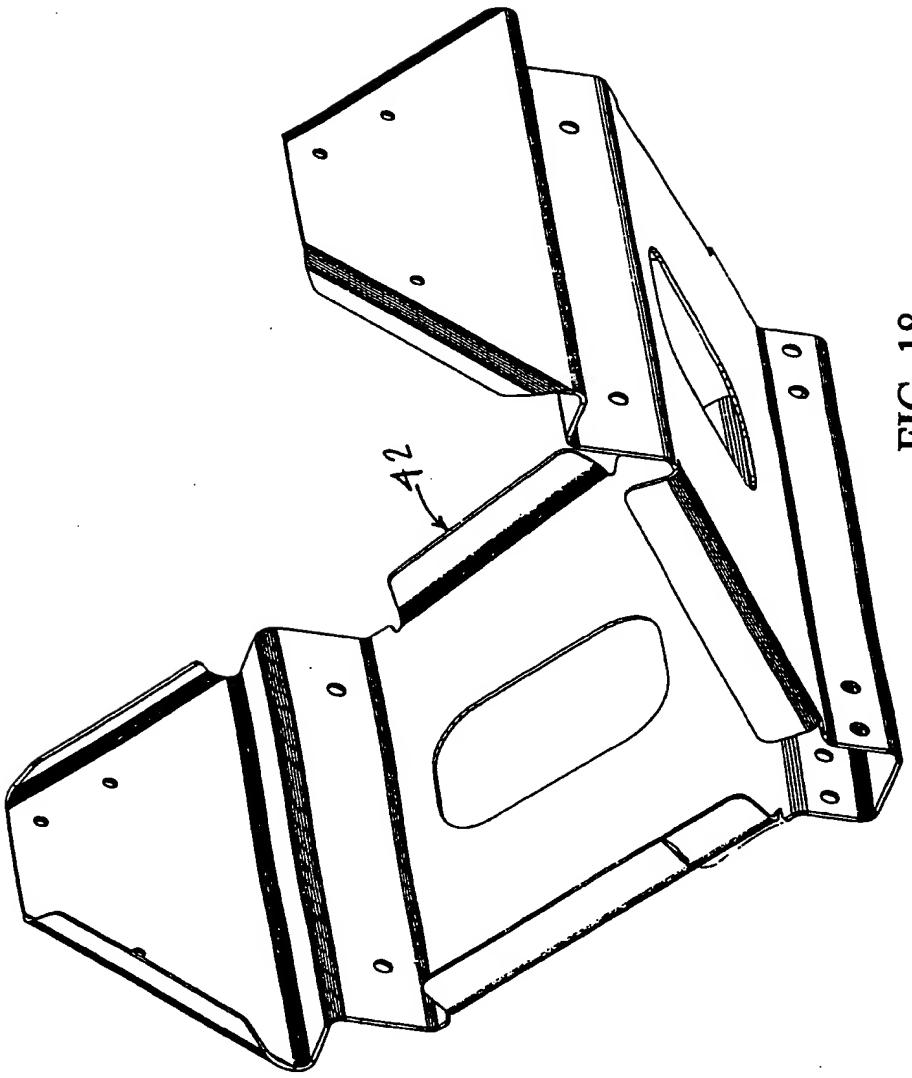


FIG. 18

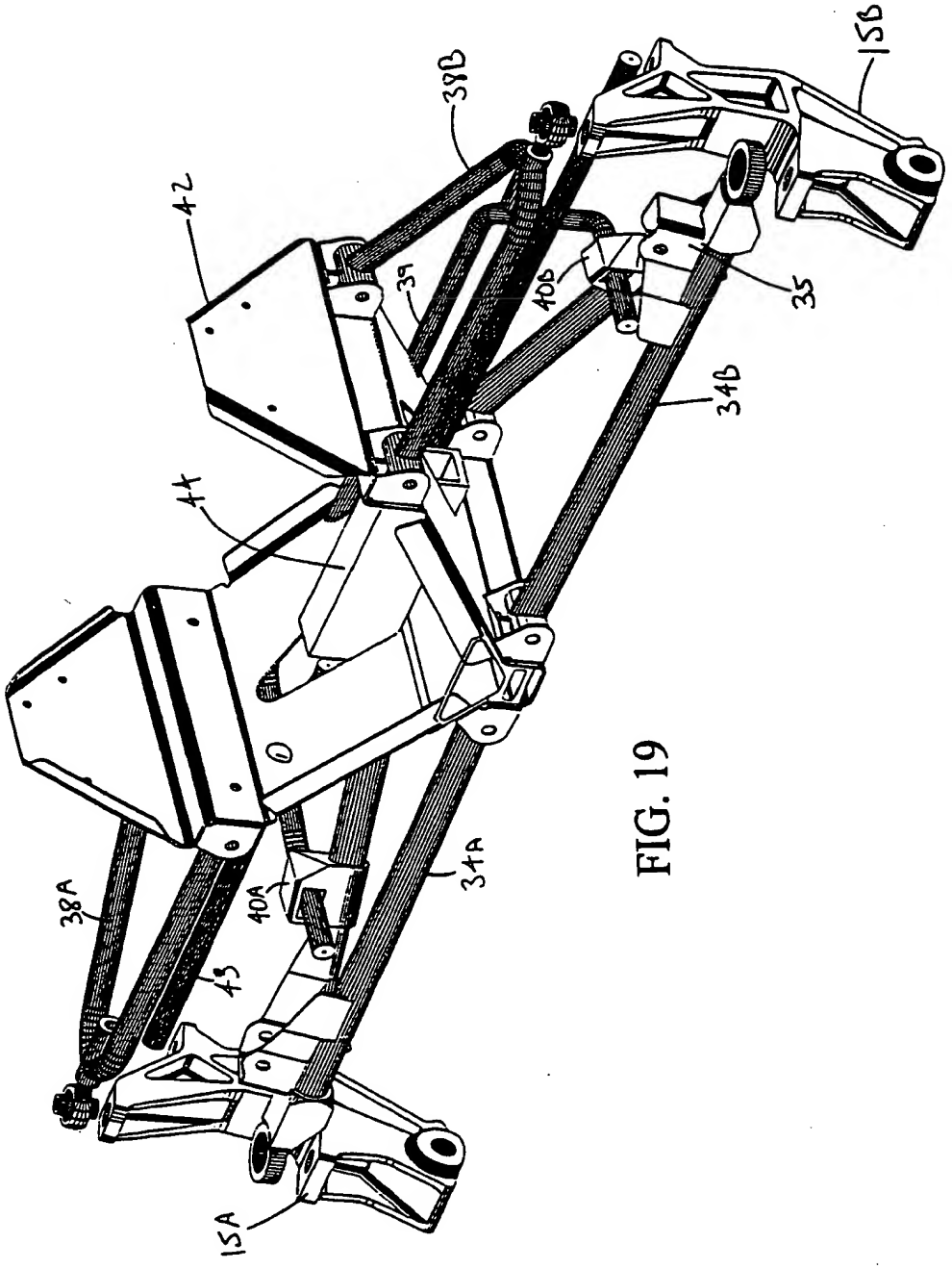


FIG. 19

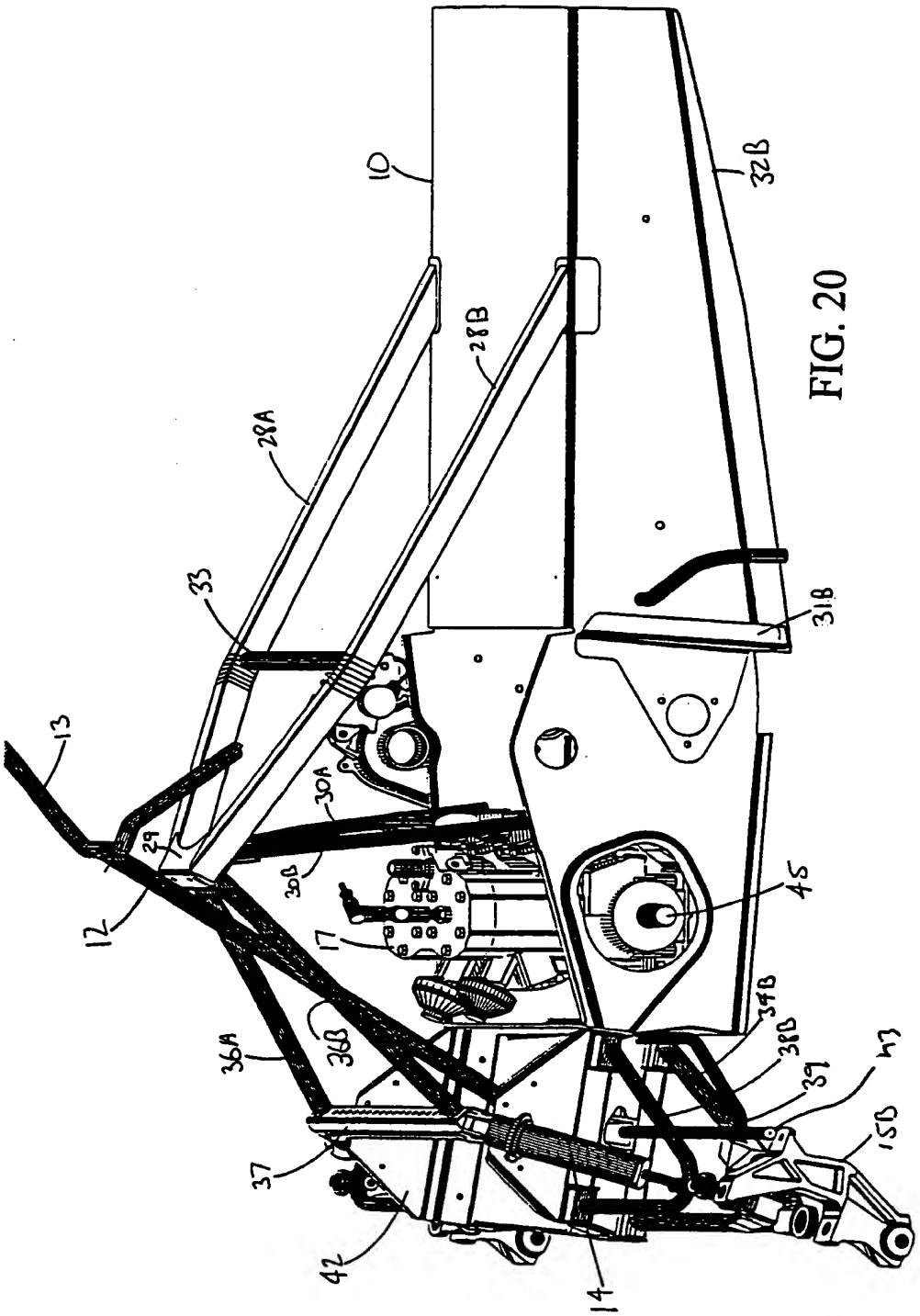


FIG. 20

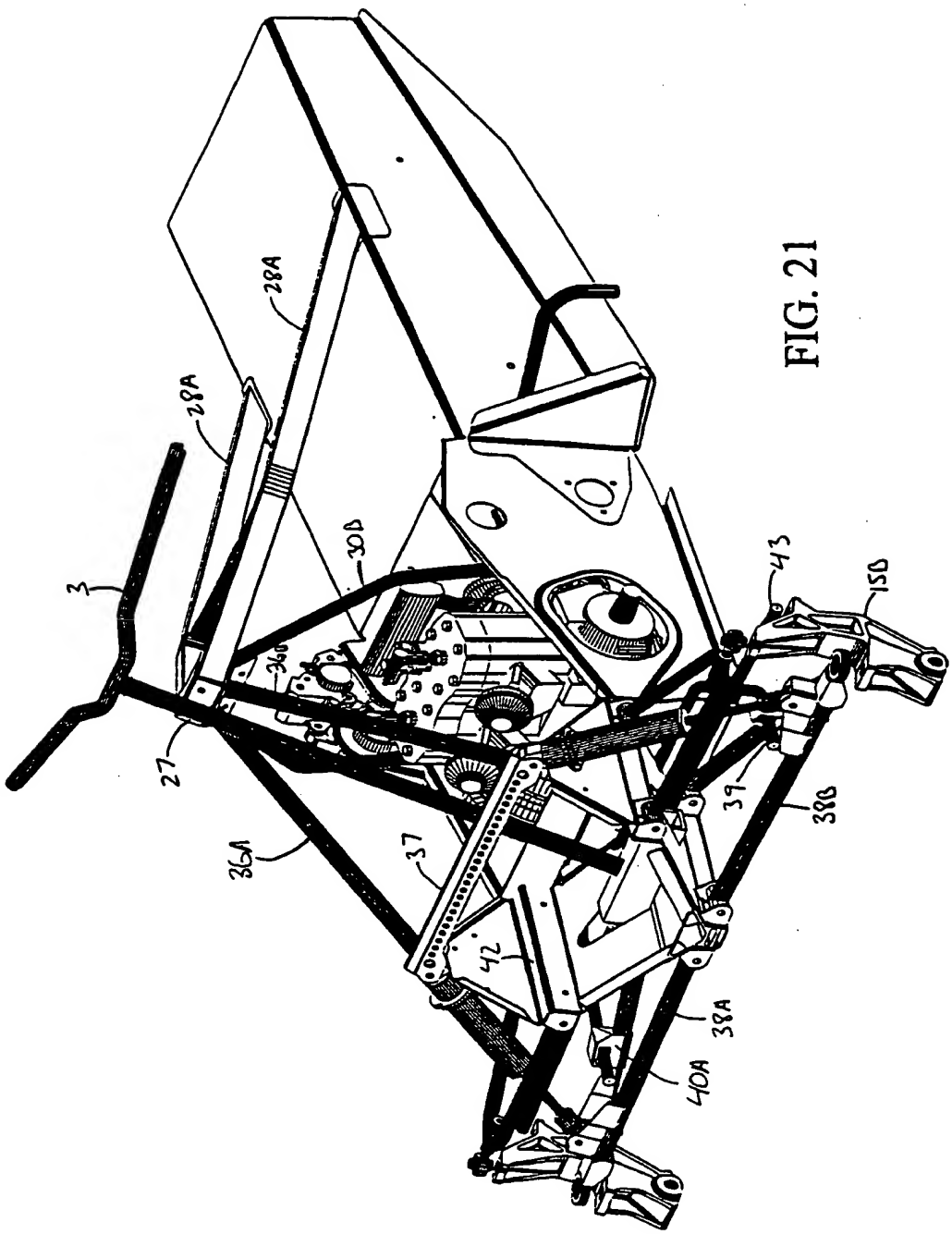


FIG. 21

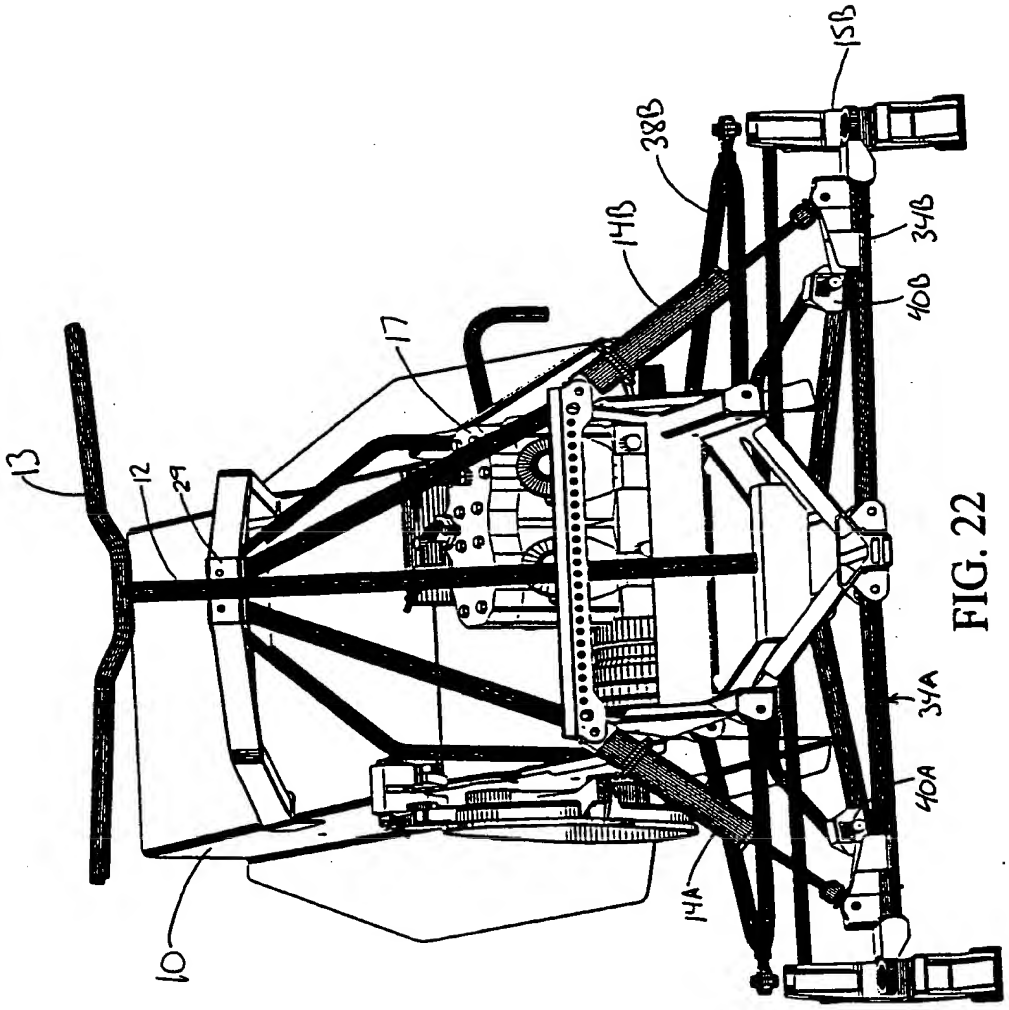


FIG. 22

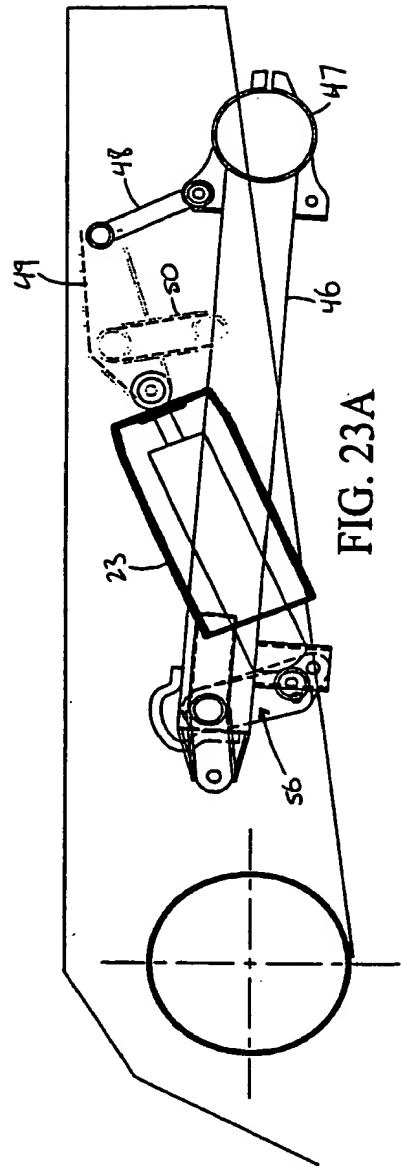


FIG. 23A

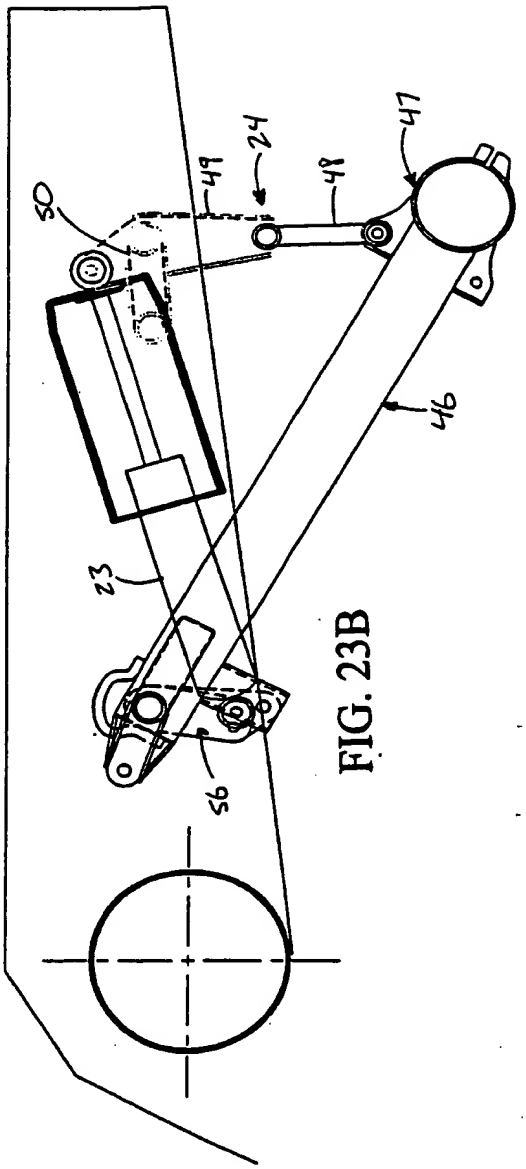


FIG. 23B

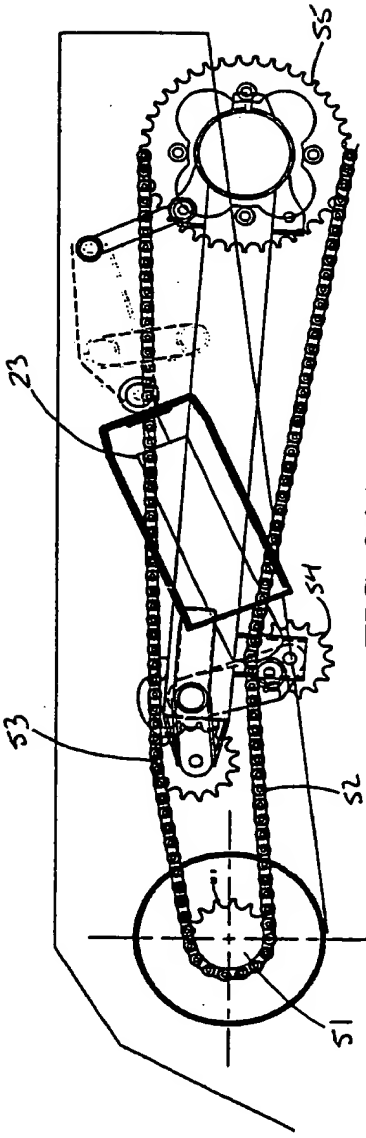


FIG. 24A

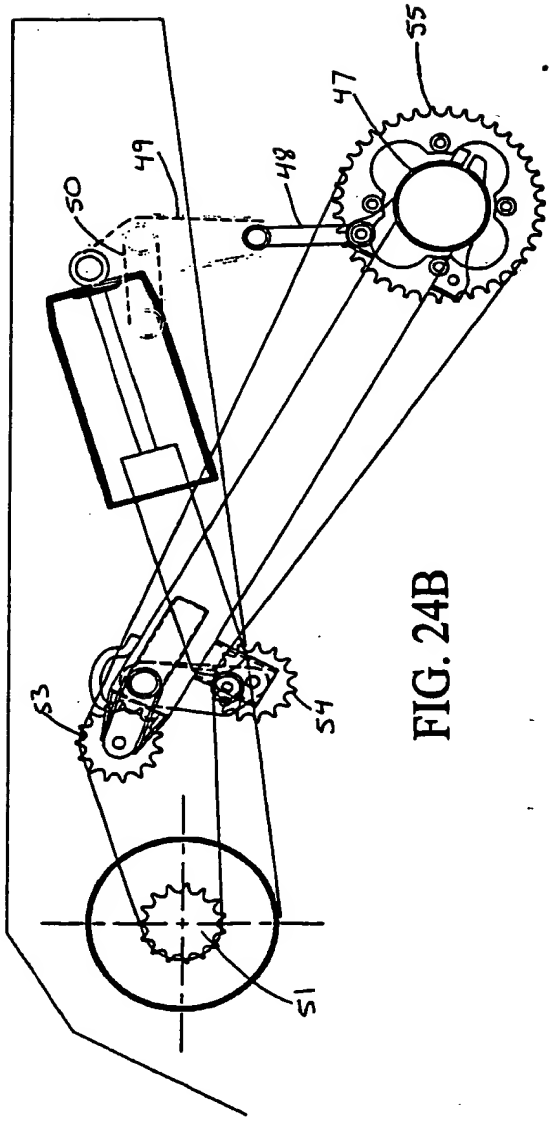


FIG. 24B

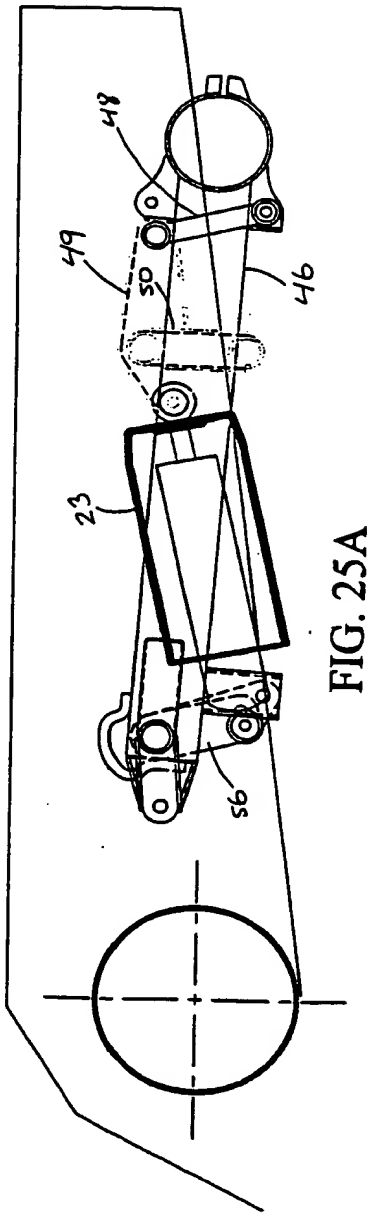


FIG. 25A

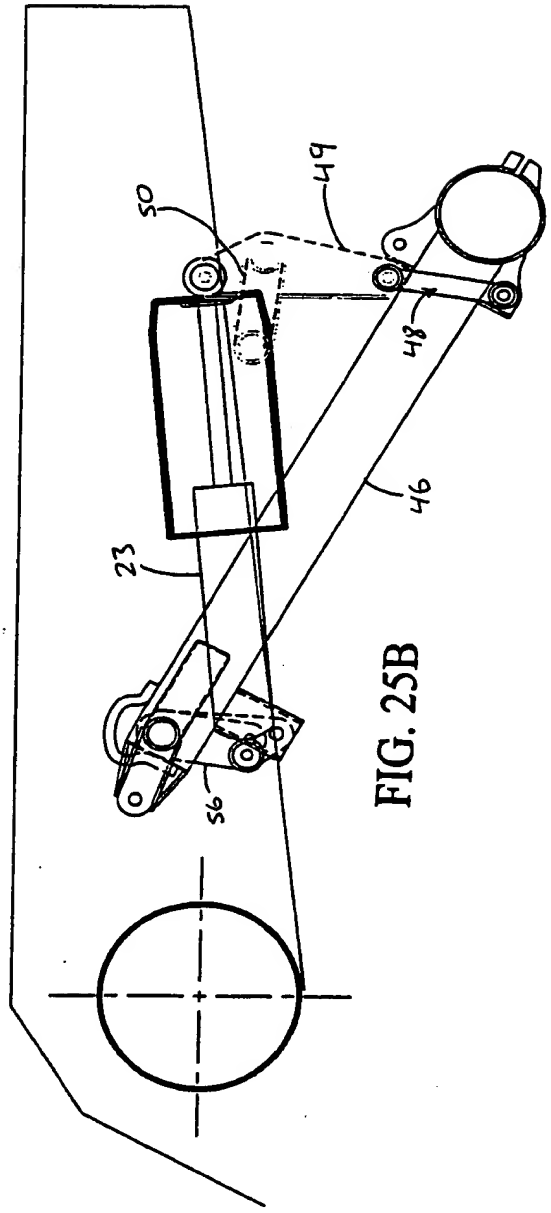


FIG. 25B

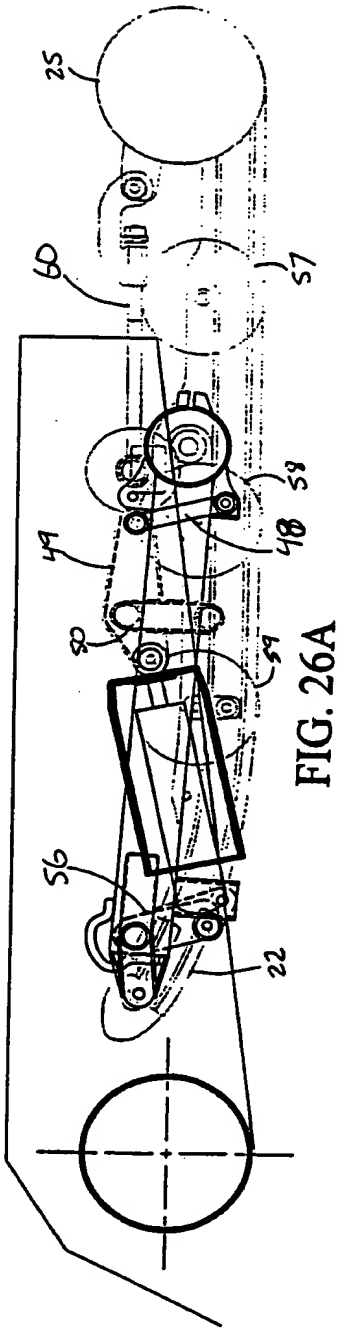


FIG. 26A

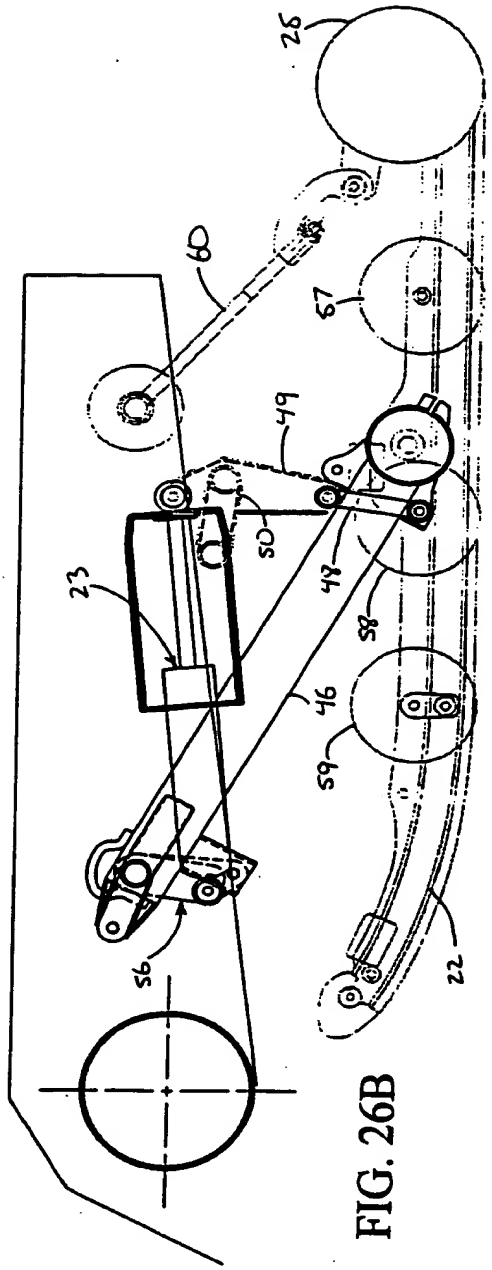


FIG. 26B

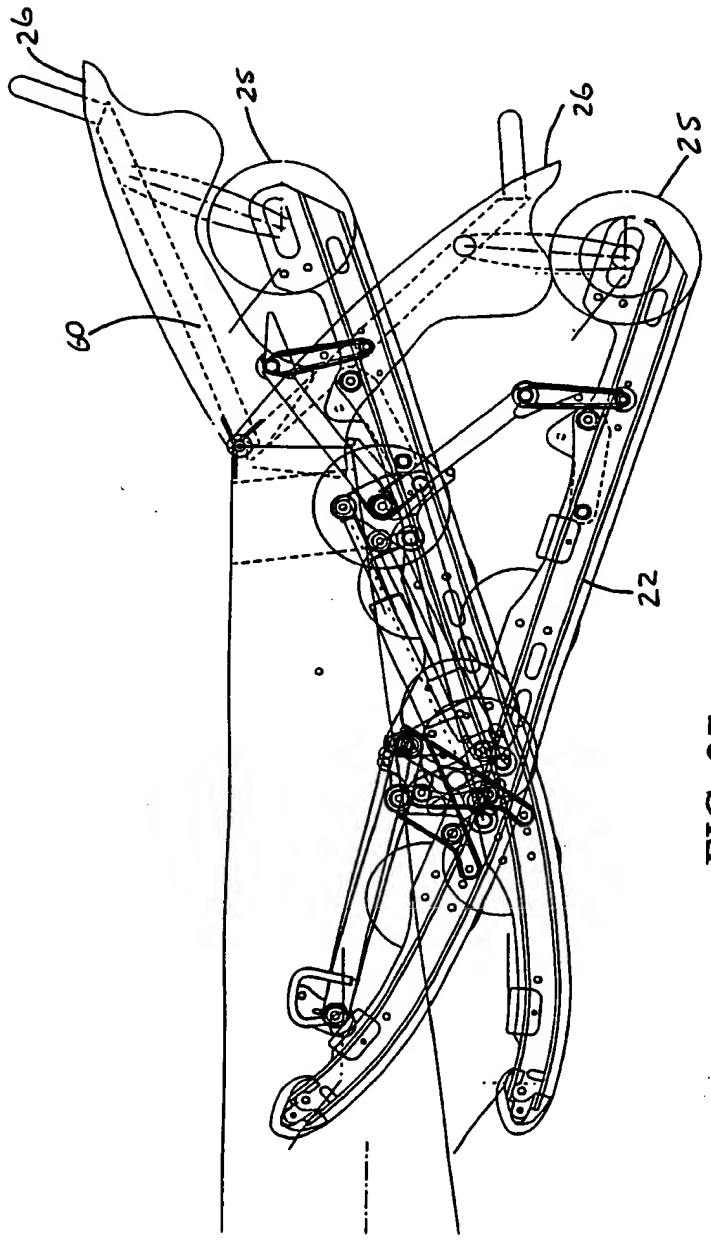


FIG. 27

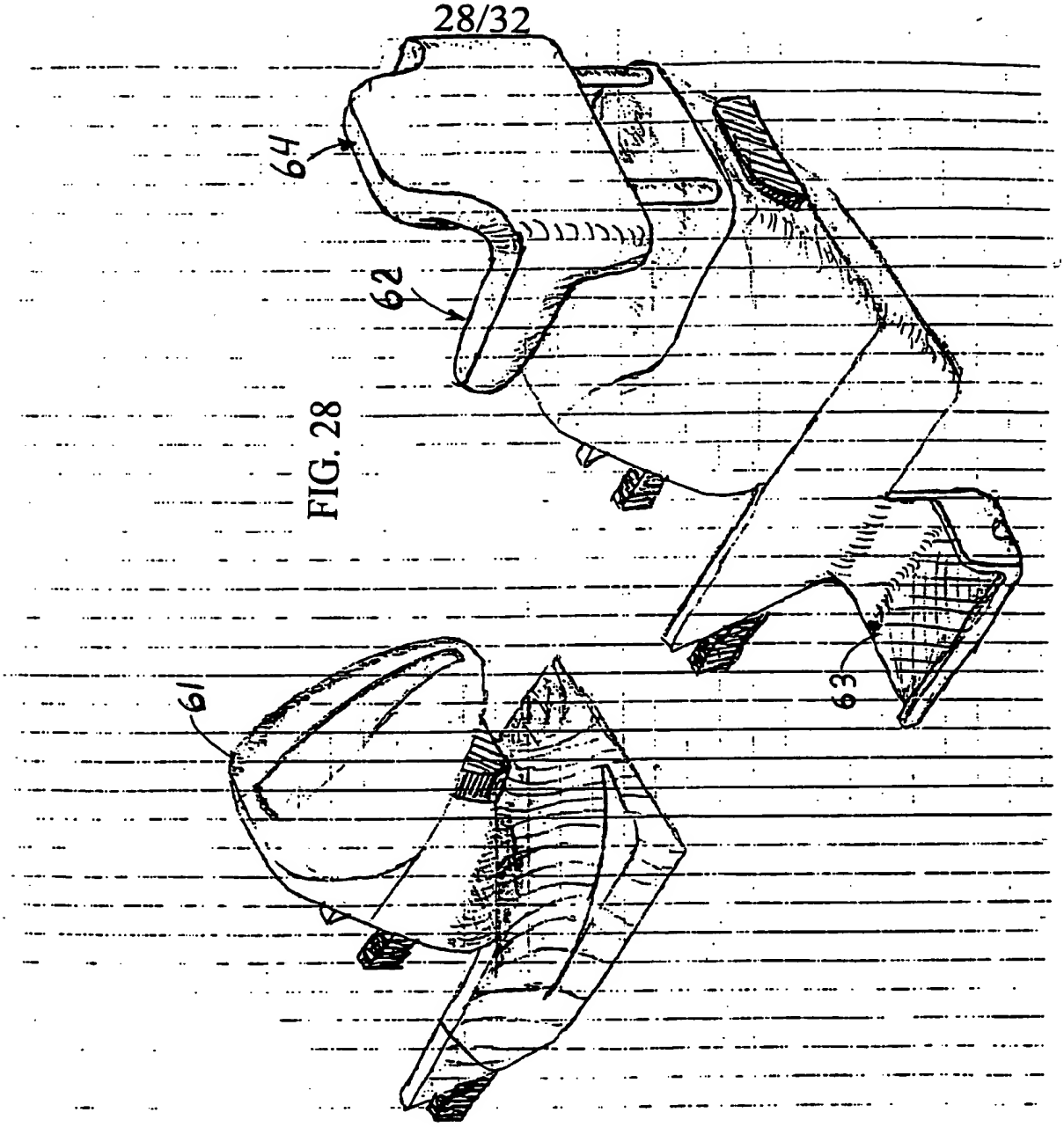


FIG. 28

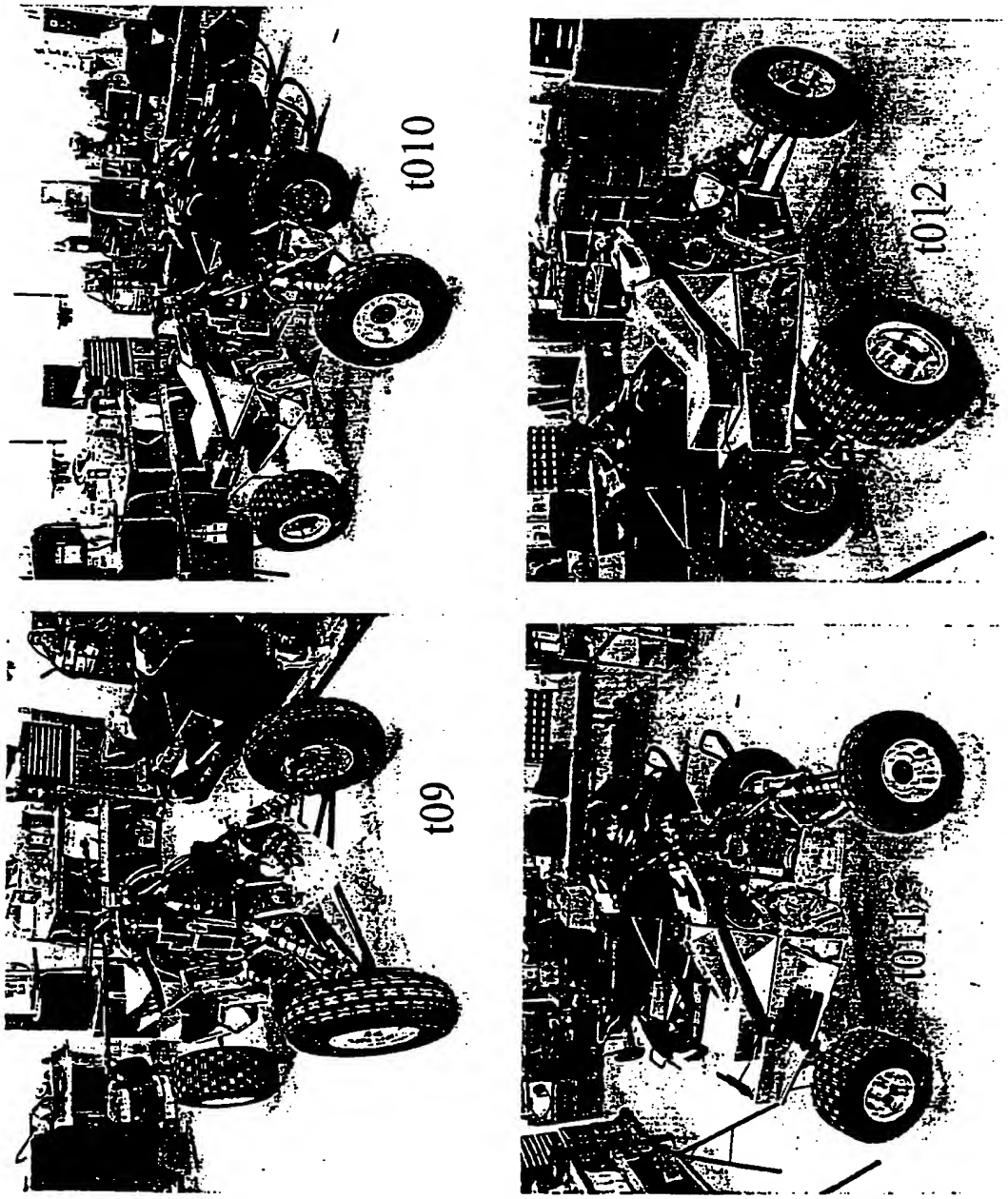


FIG. 29

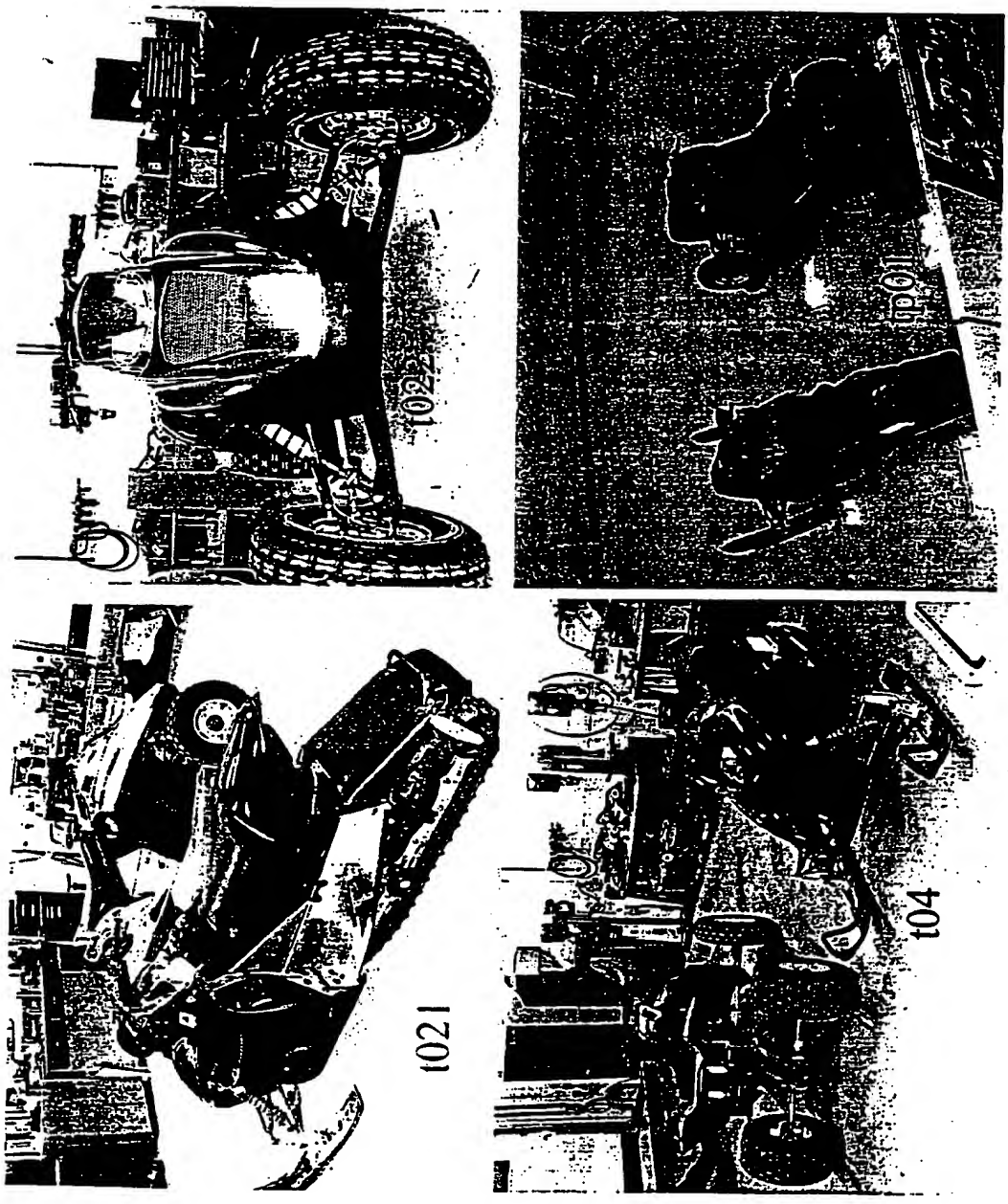


FIG. 30

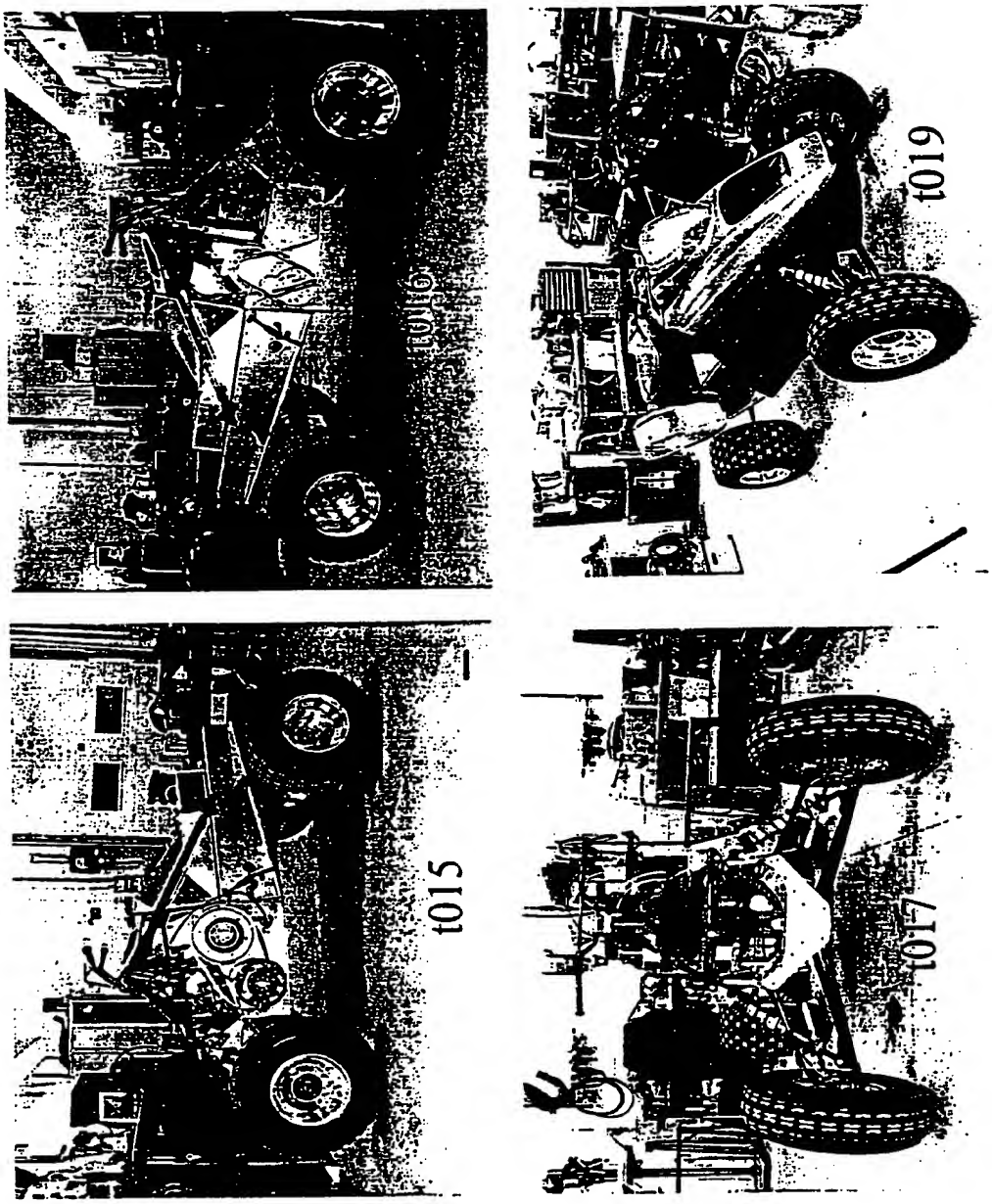


FIG. 31

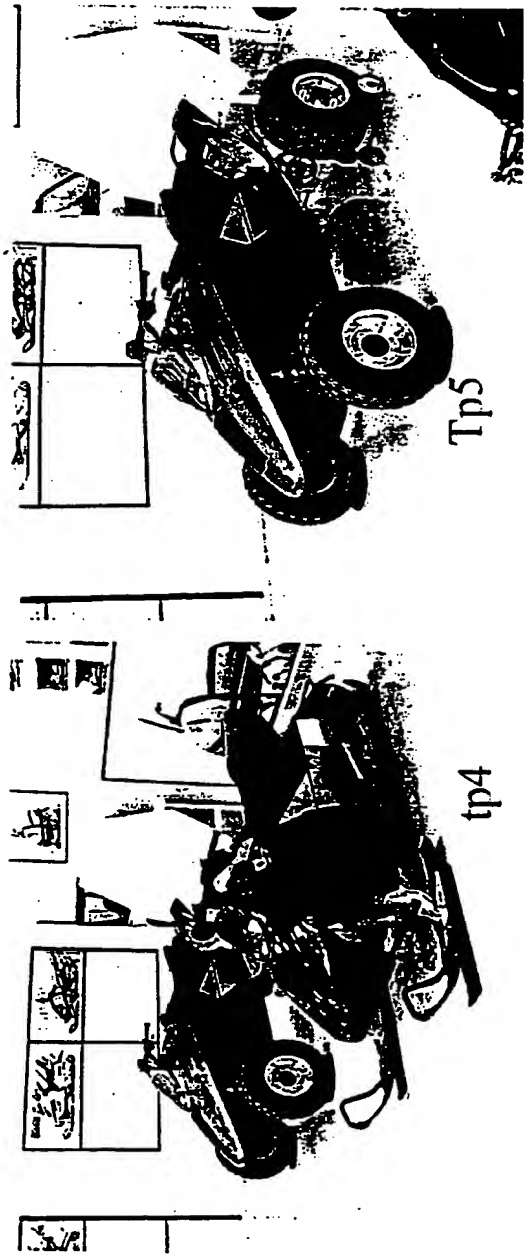


FIG. 32